

412th Test Wing
Civil Engineer Group
Environmental Management Division
Edwards Air Force Base, California



**ENVIRONMENTAL ASSESSMENT FOR
PROPOSED UTILITY CORRIDORS AT
EDWARDS AIR FORCE BASE,
CALIFORNIA**

Final

July 2016

COVER SHEET

ENVIRONMENTAL ASSESSMENT FOR PROPOSED UTILITY CORRIDORS AT EDWARDS AIR FORCE BASE, CALIFORNIA

Lead Agency: U.S. Air Force

Cooperating Agency: None

Proposed Action: Identification and establishment of utility corridors at Edwards AFB.

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Report Designation: Draft Environmental Assessment (EA)

Abstract: The project proponent is the 412th Test Wing (TW), Civil Engineer Group. The Group's purpose and need for the Proposed Action are driven by requirements to promote the efficient and economical use of real property assets at Edwards AFB in accordance with Executive Order (EO) 13327, Federal Real Property Asset Management. DoD leasing tools such as 10 USC §2667, *Leases: Non-Excess Property of Military Departments and Defense Agencies* allow the Air Force to lease non-excess real property for terms that promote the national defense or are in the public interest. Concurrently, the proponent seeks to limit the locations of future utility installation routes on Edwards AFB to specific pre-selected routes that avert continued impacts to mission development and execution and minimize impacts to the installation's infrastructure and environmental resources.

Over the course of years, Edwards AFB has been increasingly approached from every direction by private and public utilities with requests to access/traverse the installation to install utilities, often in areas that could negatively impact the mission, infrastructure and environmental resources. This trend drives the need for Edwards AFB to identify specific corridors for its own use and the use of external utility companies that minimizes these impacts.

A Utility Corridor Area Development Plan (ADP) was developed as part of the Edwards AFB Installation Development Plan. The ADP identifies nine corridors that could potentially be used for the routing of utilities through the Base. Possible compatible functions for these corridors include existing easements, north-south and east-west traversing the Base and take into consideration current easements, communication cables, overhead power lines and existing infrastructure alignments.

Pursuant to the *National Environmental Policy Act of 1969*, this Environmental Assessment (EA) documents the potential qualitative impacts that could result from development within seven designated utility corridors at Edwards AFB.

**FINDING OF NO SIGNIFICANT IMPACT /
FINDING OF NO PRACTICABLE ALTERNATIVE
PROPOSED UTILITY CORRIDORS
EDWARDS AIR FORCE BASE, CALIFORNIA**

Pursuant to the Council on Environmental Quality regulation for implementing the procedural provisions of the National Environmental Policy Act (NEPA), Title 40 of the Code of Federal Regulations (CFR) §§ 1500–1508; Air Force Environmental Impact Analysis Process (EIAP) regulations 32 CFR § 989, the Air Force has prepared an environmental assessment (EA) to identify and assess the potential qualitative impacts on the natural and human environment that could result from development within seven designated utility corridors at Edwards Air Force Base (AFB), California.

PURPOSE OF AND NEED FOR PROPOSED ACTION (EA § 1.1, page 1) – The project proponent is the 412th Test Wing (TW) / Civil Engineer Group (CEG). The purpose and need for the Proposed Action are driven by requirements to promote efficient and economical use of real property assets at Edwards AFB in accordance with Executive Order (EO) 13327, *Federal Real Property Asset Management*. Department of Defense leasing tools such as 10 USC § 2667, *Leases: Non-Excess Property of Military Departments and Defense Agencies* allow the Air Force to lease non-excess real property for terms that promote national defense and/or are in the public's interest. Currently, the 412 TW/CEG is seeking to limit the locations of future utility installation routes on Edwards AFB to specific, pre-selected routes that avert impacts to mission development/execution and minimize impacts to the installation's infrastructure and environmental resources.

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

ALTERNATIVE 1 – CORRIDOR 1 (EA § 2.3, pages 13 to 14) – This utility corridor spans from Edward AFB's southern boundary (120th Street East) to it's northern boundary. It is approximately 20 miles long by 1,000 feet wide (about 2,424 acres). The corridor follows natural terrain contours and is within close proximity to several drop zones and utility/microwave data transmission lines-of sight. Portions of the corridor pass through several cultural sites eligible for listing on the National Register of Historic Places (NRHP) as well as sensitive natural resource areas. Suitable utilities for Corridor 1 include underground gas, water, communication, electric, or power transmission lines.

ALTERNATIVE 2 – CORRIDOR 2 (EA § 2.4, pages 14 to 15) – This utility corridor begins at the western boundary of the installation at Rosamond Boulevard (Blvd) and parallels this road. It is approximately 12 miles long and is 500 feet wide (about 727 acres) in order to maintain the integrity of the dry lake bed. This corridor is needed to provide an important east-west option for utility placement. It crosses the Combat Arms Training and Maintenance (CATM) firing fan, terminating at the intersection point of Corridor 1. Although Corridor 2 crosses the CATM firing fan, it follows an existing communications infrastructure utility corridor in the area. There are two NRHP-eligible sites along with several sensitive natural resource areas. The corridor also crosses a 100-year floodplain. Suitable utilities for Corridor 2 include buried communication, electric, transmission, and water lines.

ALTERNATIVE 3 – CORRIDOR 3 (EA § 2.5, page 15-16) – This utility corridor, also known as the Shuttle Road Corridor, follows Shuttle Road at the western-most edge of the installation. The corridor starts from Avenue E in the south and goes to Trotter Road in the north. The corridor is approximately 15.5 miles in length and 1,000 feet wide (about 1,879 acres). It passes through several NRHP-eligible sites as well as sensitive natural resource areas. Suitable utilities for Corridor 3 include underground gas, water, communication, electric, or power transmission lines.

ALTERNATIVE 4 – CORRIDOR 4 (EA § 2.6, page 16) – This utility corridor traverses the north eastern corner of the installation, paralleling U.S. Route 395 and remains east of both the highway and the eastern edge of the Precision Impact Range Area (PIRA). To the west is the active range. The corridor is approximately 2 miles in length and 1,000 feet wide (about 242 acres). While there are few known cultural resources within this corridor, it does cross sensitive natural resource areas. Suitable utilities for Corridor 4 include buried communication, electric, transmission, and water lines.

ALTERNATIVE 5 – CORRIDOR 5 (EA § 2.7, pages 16-17) – This utility corridor begins at the northern boundary of the installation, parallels State Route (SR) 58, and terminates at Kramer Junction along the north eastern corner. It is approximately 30 miles long and is 1,000 feet wide (about 3,636 acres). The corridor follows several active easements and passes through several NRHP-eligible sites and sensitive natural resource areas. Suitable utilities for Corridor 5 include buried communication, electric, transmission, and water lines.

ALTERNATIVE 6 – CORRIDOR 6 (EA § 2.8, pages 17-18) – This utility corridor runs from mid-Rosamond Blvd and connects to either Corridor 1 or Corridor 2. It is nearly 4 miles long depending on the terminus and 500 feet wide (about 242 acres). There are few known concerns with cultural/natural resources; however, it does cross desert tortoise habitat along with other sensitive state species. Because this utility corridor is within the departure pattern for the main runway, only underground utilities such as communication, electric, transmission, or water lines should be considered.

ALTERNATIVE 7 – CORRIDOR 9 (EA § 2.9, page 18) – This utility corridor would allow for connectivity to the northwest corner of the installation and would tie into Corridor 1. This corridor is nearly 11 miles in length and 1,000 feet wide (about 1,333 acres). There is at least one NRHP-eligible site within the corridor and it passes through sensitive natural resource areas. Because above ground poles could impact range telemetry or radio frequency (RF) propagation, suitable utilities for Corridor 9 include buried communication, electric, transmission, and water lines.

ALTERNATIVE 8 – NO ACTION ALTERNATIVE (EA § 2.10, pages 18-19) – Under the No Action Alternative (Alternative 8), the Air Force would continue to designate utility corridors by either using existing routes or designating new routes on a case-by-case basis. The new routes would require the installation to individually assess operational, environmental, and physical constraints each time, thus duplicating efforts for each new utility proposal. The No Action Alternative allows for limited utility route widths, rather than the wider widths identified within each of the alternatives. The No Action Alternative provides a baseline of the existing environmental, social, and economic conditions to compare the alternatives against.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS (EA § 2.2, pages 10-13) – Two additional corridors were considered but eliminated from further study, because they did not meet operational and technical selection criteria. Corridor 7 runs along Lancaster Blvd from the south base boundary to the north base boundary. It is over 16 miles in length and 1,000 feet wide (about 1,939 acres). This route passes through the heart of the installation and would have over 40 existing utility/infrastructure crossings, including fuels and natural gas. Crossings are highly undesirable and would be extremely costly to install. In addition, this corridor would have potential mission encroachment conflicts, thereby making this corridor unsuitable for development. Corridor 8 parallels current roadways, including Mercury Blvd, which bounds the PIRA. This corridor is approximately 25 miles in length and 1,000 feet wide (about 3,030 acres). This route serves as a critical boundary for safety mitigation and mission support. Just the utility-related trenching and personnel presence could impact the daily high-tempo operations, thereby making this corridor unsuitable for development. In addition, construction in this area may be very intrusive to range operations and may encounter unexploded

ordnance (UXO). Attached are Figures 2-1 and 2-2, which identify the initial utility corridors evaluated and those alternatives carried forward for further environmental analyses.

ENVIRONMENTAL CONSEQUENCES

Some issues and concerns were initially considered, but subsequently eliminated from analysis in this EA because they are not applicable to this project. These issues are airspace, public safety/emergency services and environmental justice/protection of children (EA § 1.5, pages 5-6). The environmental analyses within the EA focused on the following areas: Air Quality and Greenhouse Gases (GHG), Cultural Resources, Geology and Soils, Hazardous Materials and Hazardous Waste, Infrastructure, Land Use, Natural Resources, Noise, Socioeconomics, and Water Resources.

AIR QUALITY AND GREENHOUSE GASES (EA § 4.1, pages 118-124) – Edwards AFB is located within portions of Kern, Los Angeles and San Bernardino Counties. Majority of the Proposed Action occurs within Kern County; however, Corridors 1 and 3 partially occur within Los Angeles County, Corridor 5 partially occurs within San Bernardino County, and all of Corridor 4 occurs within San Bernardino County. Both Kern and Los Angeles Counties are in attainment for all criteria air pollutants except for ozone and particulate matter less than 10 microns in diameter (PM-10) while San Bernardino County is in non-attainment for ozone, PM-2.5, and PM-10. There would be short-term, temporary fugitive dust, nitrogen oxide, volatile organic compounds and GHG emissions resulting from construction activities (i.e., backhoes, bulldozers, portable generators and cranes) within any of the corridors, which would terminate upon project completion. Long-term emissions would be generated by on-road (employee vehicles and vendor/delivery trucks) and off-road vehicles/equipment. Corridor 5 has the largest estimated project area; approximately 291 acres. Emissions from this corridor represent the greatest amount of emissions any of the corridors could emit and was used to evaluate significance for all corridors. Calculated construction emissions when compared against *de minimis* thresholds show Corridor 5 would not exceed significance thresholds for criteria pollutants nor would it result in an exceedance of GHG threshold (EA Table 4-1, page 121). Conformity analysis is not required. The 412 TW/CEG will ensure individual utility projects adhere to all federal, state, and local air quality regulations and obtain all necessary air quality permits. All earthwork activities shall incorporate best management practices (BMPs) to further control fugitive dust emissions such as covering stockpiles/transported fill material, applying water/dust suppressants to roads/open areas, keeping equipment in good working order, etc. Disturbed areas will be revegetated to reduce long-term PM emissions. Additionally, for any future actions in these corridors, the effects of climate change on any proposed action and its environmental impacts must be analyzed in additional project specific NEPA. Based on this analysis, there would be no significant impact to air quality from the Proposed Action.

CULTURAL RESOURCES (EA § 4.2, pages 124-127) – There are numerous prehistoric and historic archaeological sites found throughout Edwards AFB; therefore, a cultural resources survey was conducted on the Area of Potential Effects (APE) based on past land use activities and prior cultural resources studies available. The results of this survey provided an inventory rather than a formal evaluation of the cultural resources identified within each corridor, which aided in risk assessment. A total of 341 archaeological sites were identified. In summary, Corridors 4 and 6 had the lowest frequency of sites and the least area covered by cultural resources. Corridor 5 had the highest frequency. Within Corridors 1 and 3 there are greater numbers of significant cultural resources found, with the majority being located in the areas south of Rosamond Blvd. Table 4-1 on page 126 of the EA summarizes the number of cultural sites within each corridor. Majority of the time, the 412 TW/CEG will avoid approving utility projects within these sensitive cultural sites. Based on this analysis, no significant impacts to cultural resources would occur in Corridors 2, 4, 5, 6, and 9 and within portions of Corridors 1 and 3, north of Rosamond Blvd. If avoidance is not possible, then cultural resources will need to be evaluated prior to approving

any Corridors 1 and 3 utility design and construction south of Rosamond Blvd through the National Historic Preservation Action, Section 106 Consultation process. Table 2-2 identifies the sections within Corridors 1 and 3 that require additional NEPA analysis.

GEOLOGY AND SOILS (EA § 4.3, pages 127-136) – Edwards AFB is located within the Mojave Desert, an arid region of California. Most of the soils are sandy loams with potential for wind and water erosion. Major faults located within 12 miles of the installation include the San Andreas Fault and the Garlock Fault. Construction in any of the corridors would not damage or destroy existing landforms. An access road running parallel to the utility line would be established to support follow-on maintenance activities. All alternatives have the potential to impact soil loss due to wind or water erosion. In order to minimize these impacts, the 412 TW/CEG will ensure proponents provide a geotechnical and engineering geology study from a qualified geologist/engineer, which identifies site specific geologic conditions and potential geologic hazards from each utility proposal. The proponents will also be required to implement a storm water pollution prevention plan (SWPPP) using BMPs to control soil erosion (i.e. application of water/dust suppression palliatives, use of silt fencing, employing a concrete wash out area, etc.). Based on this analysis, there would be no significant impacts related to soils for any of the alternatives.

HAZARDOUS MATERIALS AND HAZARDOUS WASTE (EA § 4.4, pages 136-138) – Construction within any of the corridors would not mobilize existing contaminants associated with identified environmental restoration program sites at Edwards AFB in groundwater or soil, or expose workers to contaminated soils or groundwater at levels in excess of those permitted by federal, state, and local laws. Groundwater, which is at least 20 feet deep, would not be encountered during construction. Minor amounts of hazardous material such as fuels and lubricants would be used by various equipment and these activities would require limited amounts of hazardous materials stored/used on-site. Hazardous materials necessary for project implementation requiring temporary storage will comply with relevant federal, state and local laws as well as Air Force policies. With development of an approved health and safety plan prior to construction, all impacts associated with hazardous materials and hazardous waste would be minimal.

INFRASTRUCTURE (EA § 4.5, pages 138-144) – Corridors were selected specifically to avoid base infrastructure. None of the alternatives would impact existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation or communication systems currently in place at Edwards AFB. Above-ground structures associated with Corridors 1, 2, 3, 6 and 9 could have potential range impacts depending on height, utility type and proximity to microwave data transmission lines-of-sight. RF interference would also be considered for any wireless devices and should include, at a minimum, information on power, transmission characteristics and frequencies. Prior to final design selection, the proponent will be required to coordinate with 412 TW/CEG to ensure the utility layout does not conflict with current and future Air Force mission. Overall, there would be no significant impacts to infrastructure from the Proposed Action.

LAND USE (EA § 4.6, pages 144-148) – For all alternatives, above-ground poles or towers are not usually consistent with existing, mission-related uses at Edwards AFB. A portion of Corridor 1 is near the Farm Drop Zone; used routinely to support both AFMC test missions and Air National Guard sorties. Additional RF interference along Corridors 2 and 6 could potentially interfere with the Range Squadron's ability to transmit data from Point Mugu, China Lake, Palmdale, Nellis ranges, White Sands Missile Range and Vandenberg AFB. Corridor 4 is within the eastern edge of the PIRA so there is a potential for UXO contamination. No high towers can be placed along Corridors 3, 5, and 7 as aircraft often perform low altitude target run-ins. Installing underground lines for power, water or fiber would have no impact to existing land uses at Edwards AFB. The proponent will be required to coordinate their utility proposes with the Edwards Airfield Management and Range Office, 412 TW Spectrum Office and 412 TW/CEG

prior to implementation to ensure land use impacts will be avoided. With this coordination in place, there would be no significant impacts to land use from the Proposed Action.

NATURAL RESOURCES (EA § 4.7, pages 148-164) – Vegetation communities found within the proposed utility corridors include Joshua tree woodland, creosote bush scrub, saltbush scrub, mequite woodland and playa/claypans. Wildlife within the area includes reptiles, birds, and mammals; no fish or amphibians naturally occur within the area. There are two federally listed species of concern; the threatened desert tortoise and the endangered California least tern as well as numerous state listed species of concern found on Edwards AFB. Potential direct and indirect impacts on natural resources would occur during utility installation. These include disruption, trampling or removal of rooted vegetation resulting in a reduction in the total acres of native vegetation, including desert tortoise critical habitat or the direct injury or death of individual plants or animals. Potential indirect impacts include introduction of invasive species that compete with native species and can result in habitat degradation. Most of the proposed corridors follow existing roads and right-of-ways to minimize impacts. Corridor 1 is the only alternative that would occur in undeveloped areas. All of Corridor 4 and sections of the other seven corridors occur within designated critical habitat for desert tortoise. It is estimated approximately 930 acres or less than 0.2 percent of the total critical habitat would be impacted. Table 4-12 on page 154 of the EA identifies all federal and state-listed species that could be impacted within each of the corridors depending on utility scope and design.

As required by the Sikes Act, Department of Defense Instruction 4715.03, *Natural Resources Conservation Program*, and Air Force Instruction 32-7064, *Integrated Natural Resources Management (INRM)*, Edwards AFB has revised their 5-year INRM Plan, which identifies avoidance and mitigation measures required for each species of concerns as well as employs ecosystem management principles for critical habitat areas. This document was recently signed by U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW) and the 412 TW Commander in 2015 (EA Appendix D) as the guiding document for integrating natural resources stewardship within the Edwards AFB military mission. All utility projects within Corridors 2, 4, 5, 6, and 9 will incorporate these mitigation into their design; therefore, no significant impacts to natural resources would occur. Concerning Corridors 1 and 3, there would be no significant impacts to projects occurring north of Rosamond Blvd. However, for utility projects sited south of this boulevard, Section 7 Consultations as required by the Endanger Species Act will be completed with USFWS and CDFW to identify site-specific mitigations that may be required prior to developing the selected location. Table 2-2 identifies the sections within Corridors 1 and 3 that require additional NEPA analysis.

NOISE (EA § 4.8, pages 164-166) – The major sources of noise at Edwards AFB are vehicle traffic mainly on Lancaster and Rosamond Blvds and aircraft operations, including air traffic and engine testing. Noise impacts related to development of utility corridors would primarily be from construction operations. Once installed, only negligible noise impacts associated with maintenance activities would occur. Only corridors 1 and 5 have segments relatively close to sensitive receptors. Corridor 5 has segments where it is approximately 3,000 feet away from Muroc Unified School District and Corridor 1 has a segment adjacent to the west end of the family housing area. To minimize noise, the proponent will insure operation of construction equipment be limited to the hours between 0700 and 1700, Monday through Friday. Based on this analysis, exposure to noise would be short term and not significant.

SOCIOECONOMICS (EA § 4.9, pages 167-168) – Construction activities for each of the alternatives would result in a temporary, beneficial increase in local employment and the use of local goods and services; however, there would be no long-term, significant socioeconomic impacts from the Proposed Action.

WATER RESOURCES (EA § 4.10, pages 169-174) – Edwards AFB is located in a basin that is essentially closed to both surface drainage and groundwater movement. While there are no perennial streams on or near the installation, there are permanent playa lakebeds. These lakebeds are typically dry except during the rainy seasons when they are subject to significant flooding after heavy, seasonal storms. Storm water runoff is directed towards Rogers Dry Lake, Rosamond Dry Lake, and Buckhorn Dry Lake. There are no jurisdictional waters at Edwards AFB due to a lack of connectivity or adjacency to navigable waters or waters otherwise used for interstate commerce. All permanent surface water on base is a result of detention ponds and/or impoundments. None of the corridors cross a documented 100-year floodplain except for Corridor 2, where it crosses the northern portion of Rosamond Dry Lake. This corridor cannot be moved further north out of the floodplain because the terrain becomes too steep in Bissell Hills. If moved further south, the corridor would impact additional miles of floodplain within Rosamond Dry Lake. Because numerous unnamed ephemeral drainages bisect all corridors and individual projects could disturb more than one acre of land, the proponent will be required to obtain a Generic Permit for Storm Water Discharge for Large and Small Construction Activities under the National Pollutant Discharge Elimination System prior to project initiation. As part of this application, a storm water pollution prevention plan, which identifies the type of mitigations and BMPs to be implemented to control erosion, will be developed. If utilities are constructed within the floodplain, 412 TW will ensure the proponent incorporates required mitigations for reducing flooding hazards as identified by a qualified, state of California registered geologist or engineer into the final design. This may include prohibiting construction during the rainy season and adding design features in the project to minimize flooding impacts to the project. Once construction is complete, use of the corridor for a particular utility would not affect water flow, runoff, or the floodplain itself. None of the corridors would result in an increase in groundwater withdrawal at Edwards AFB.

ENVIRONMENTAL / LAND USE CONSTRAINTS

The primary objective of this EA was to assess the potential qualitative impacts on the natural and human environment that could result from development activities within seven designated utility corridors at Edwards AFB. This analysis utilized existing geographic information along with other environmental studies/reports to determine locations of both constrained and unconstrained areas. Edwards AFB identified the following constraints: mission impacts, wetlands/100-year floodplain, cultural restricted areas and habitat for threatened/endangered flora and fauna. Table 2-2 on pages 25 to 29 of the EA summarizes the types of mitigations that will be implemented within each of the corridor for future utility proposals. This EA does not authorize implementation of any proposed utility project occurring in an environmentally constrained area without additional NEPA analysis being conducted. With proper documentation and coordination with Edwards AFB personnel, some development activities may take place in areas where land use constraints occur. However, in every case, additional project specific NEPA will be required for any future actions in these corridors.

PUBLIC REVIEW / INTERAGENCY COORDINATION

Copies of the draft EA and draft FONSI/FONPA were mailed to six agencies, seven libraries, and the California State Clearinghouse. A notice was placed in the *Antelope Valley Press* of Lancaster, California on June 3, 2016 beginning public review period. The 30-day comment period ended on July 5, 2016 with no comments received. A scoping meeting on the draft environmental assessment was held in Mojave on June 22, 2016, soliciting public comments on the action occurring within the Rosamond Dry Lake 100-year floodplain. No one from the public attended.

FINDING OF NO SIGNIFICANT IMPACT

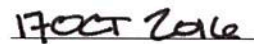
After consideration of relevant environmental consequences explained in the Final EA and summarized above, I conclude Alternatives 2, 4, 5, 6 and 7 and portions of Alternatives 1 and 3 north of Rosamond Blvd, would not have significant direct, indirect or cumulative impacts on the environment. Accordingly, the requirements of NEPA, regulations promulgated by the President's Council on Environmental Quality and 32 CFR Part 989 are fulfilled and an Environmental Impact Statement is not required for these areas at this time. Concerning the southern portions of Corridors 1 and Corridor 3 as annotated in Figure 2-2, a Finding of No Significant Impact cannot be determined. No action within the southern portions of Corridors 1 and 3, as annotated in Figure 2-2, will be taken at this time until further NEPA analysis is completed to determine impact significance to the cultural and natural resources.

FINDING OF NO PRACTICABLE ALTERNATIVE

Pursuant to the requirements of Executive Order 11988, *Floodplain Management*, as amended by Executive Order 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input*, and considering all supporting information, I find there is no practicable alternative but to locate Corridor 2 within the floodplain as described in the attached EA and that the Proposed Action includes all practicable measures to minimize harm to the environment. This finding both fulfills requirements of the referenced Executive Order and EIAP regulation 32 CFR § 989.14 for a Finding of No Practicable Alternative.



RONALD J. ONDERKO, P.E.
Command Senior Civil Engineer
Logistics, Civil Engineering and Force Protection



Date

2 Attachments:

1. Figure 2-1, Utility Corridor Options Evaluated
2. Figure 2-2, Proposed Utility Corridor Alternatives

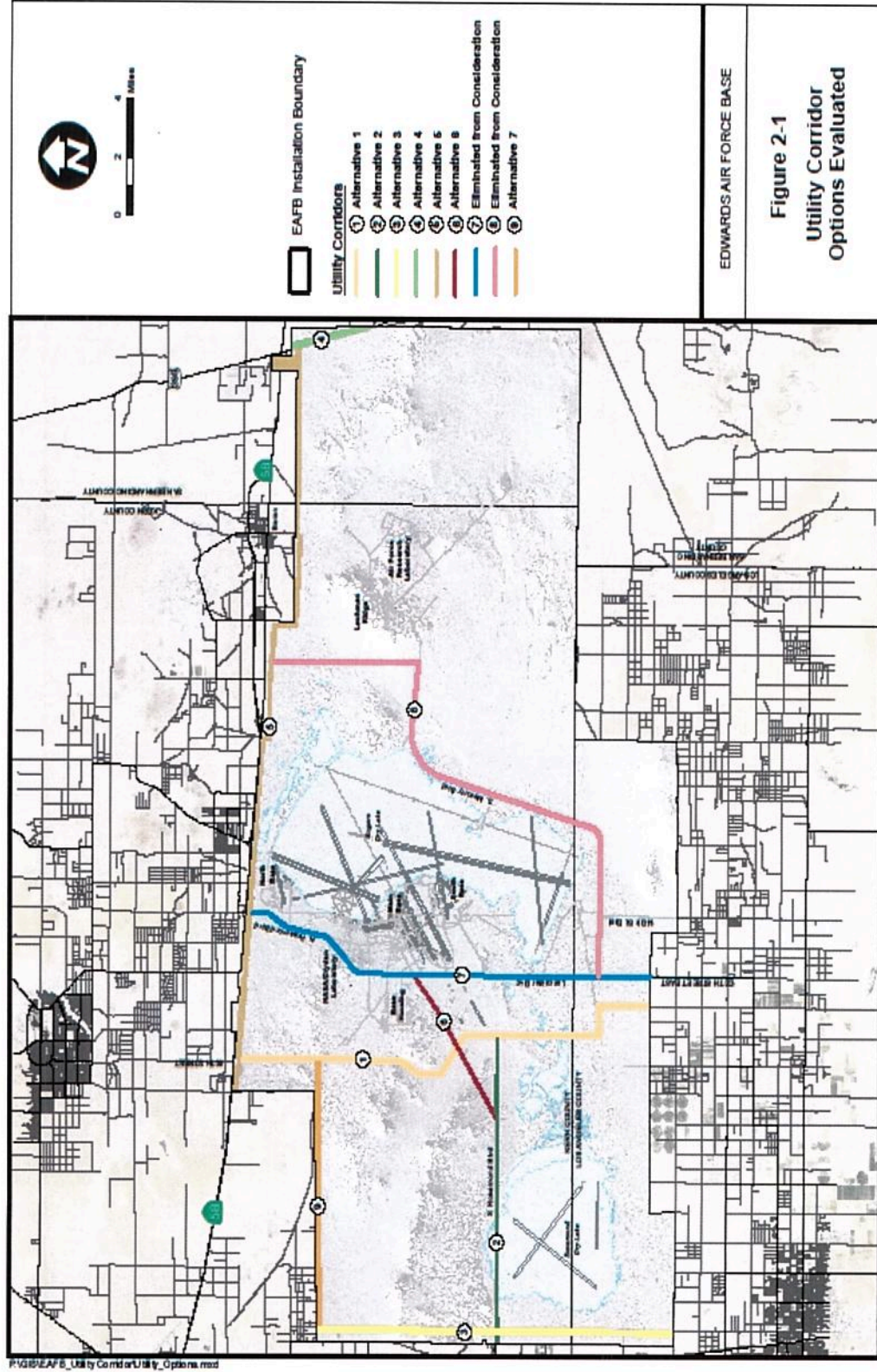


Figure 2-1 Utility Corridor Options Evaluated

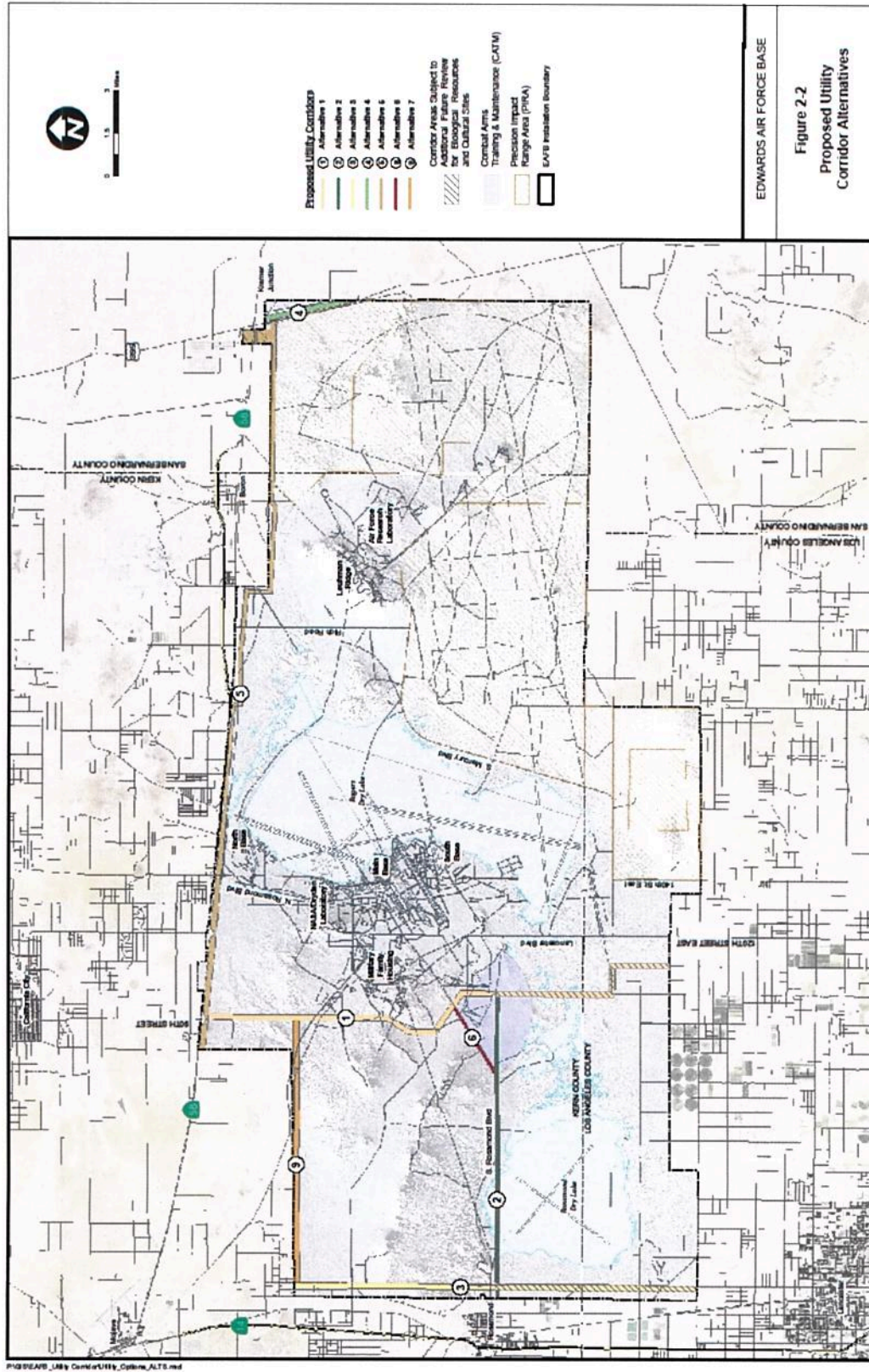


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1.0 INTRODUCTION

This Environmental Assessment (EA) evaluates the potential qualitative environmental impacts associated with the identification and establishment of utility corridors on Edwards Air Force Base (AFB), California with the intent that they could be used by Air Force and non-Air Force proponents to traverse the installation and connect private feeds from the surrounding communities. The corridors could be used for electric, communication, natural gas, liquid fuel or water lines. The analysis provided in this EA is qualitative and at a programmatic level and, as such, is intended to identify potential environmental impacts associated with developing utilities in the proposed corridor areas and to facilitate decision-making on whether these areas are logical alternatives for utility corridors. Specific development in any of the corridors would require further, detailed environmental review and documentation specific to the type and location of utility lines proposed.

This EA was prepared in accordance with all applicable federal, state and local laws and regulations including the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500–1508); and US Air Force Instruction (AFI) 32-7061, *The Environmental Impact Analysis Process (EIAP)*, as codified in 32 CFR Part 989. The 412th Civil Engineer Group (CEG) is representing the Department of Defense (DoD) as the lead agency.

1.1 PURPOSE OF AND NEED FOR PROPOSED ACTION

The project proponent is the 412th Test Wing (TW), Civil Engineer Group. The Group's purpose and need for the Proposed Action are driven by requirements to promote the efficient and economical use of real property assets at Edwards AFB in accordance with Executive Order (EO) 13327, Federal Real Property Asset Management. DoD leasing tools such as 10 USC §2667, *Leases: Non-Excess Property of Military Departments and Defense Agencies* allow the Air Force to lease non-excess real property for terms that promote the national defense or are in

the public interest. Concurrently, the proponent seeks to limit the locations of future utility installation routes on Edwards AFB to specific pre-selected routes that avert continued impacts to mission development and execution and minimize impacts to the installation's infrastructure and environmental resources.

1.2 BACKGROUND

Over the course of years, Edwards AFB has been increasingly approached from every direction by private and public utilities with requests to access/traverse the installation to install utilities, often in areas that could negatively impact the mission, infrastructure and environmental resources. This trend drives the need for the Base to identify specific corridors for its own use and the use of external utility companies that minimizes these impacts.

A *Utility Corridor Area Development Plan* (ADP) was developed as part of the Edwards AFB Installation Development Plan and is provided in Appendix A. The ADP identifies nine corridors that could potentially be used for the routing of utilities through the Base. Possible compatible functions for these corridors include existing easements, north-south and east-west traversing the Base and take into consideration current easements, communication cables, overhead power lines and existing infrastructure alignments. Initial natural and cultural resources evaluations of the routes in the ADP were completed using data previously collected by the Edwards AFB Environmental Management Division. Project-specific NEPA analysis to include cultural resources, natural resources and floodplain considerations and National Historic Preservation Act Section 106 consultation, will need to be conducted prior to any action or development in any corridors. Further, there is no approval to disturb the entire area within any of these corridors; Edwards AFB will evaluate each proposed project to determine the significance of the environmental impacts, including cumulative effects, prior to approval of any project, Edwards AFB reserves the right to refuse access to these corridors for installation of new utilities. In addition, Edwards AFB prefers new utility projects within these corridors be planned as underground developments as much as possible. A summary of the installation constraints considered in the analysis for acceptable utility corridors, both natural and manmade, is provided in the *Utility Corridor Area Development Plan*, provided in Appendix A (Edwards AFB, 2015).

1.3 LOCATION OF PROPOSED ACTION

The Proposed Action would occur on Edwards AFB which is located in the Antelope Valley region of the western Mojave Desert in Southern California, about 60 miles northeast of Los Angeles, California. Portions of the Base lie within Kern, Los Angeles and San Bernardino counties. The Base occupies an area of 307,517 acres or 470 square miles and consists of largely undeveloped or semi-improved land that is used predominantly for aircraft test ranges and maintained and unmaintained landing sites (i.e., dry lake beds). The Base is bounded by state highways 14 to the west and 58 to the north; and US Route 395 to the east; with county road Avenue E near the southern boundary of the Base. The developed portion of the Base includes approximately six percent of the total base area; it is concentrated on the west side of Rogers Dry Lake and includes North Base, South Base, Main Base and Family Housing areas (Figure 1-1).

Elevations on the Base range from approximately 692 to 1,038 meters (2,270 to 3,404 feet) above mean sea level (AMSL) with the lowest elevations found in the two major dry lakebeds, Rogers and Rosamond Dry Lakes. Higher elevation areas are found along ridges in the Rosamond and Bissell Hills in the northwest area of the Base, along Leuhman Ridge in the northeast and Haystack Butte in the southeast.

Edwards AFB lies in an extreme climate zone. The western Mojave Desert is characterized by both very high and very low temperatures, high winds and rainfall typically less than 3 inches per year. The local climate is characterized by two well-defined seasons, summer (hot and dry) and winter (mild and windy), with two short transitional periods in the spring and fall. Due to the relatively high altitude (2,300 feet above sea level) and dry atmosphere, there is a wide daily range in temperature during most seasons. Most precipitation occurs between November and March (Edwards, 2013).

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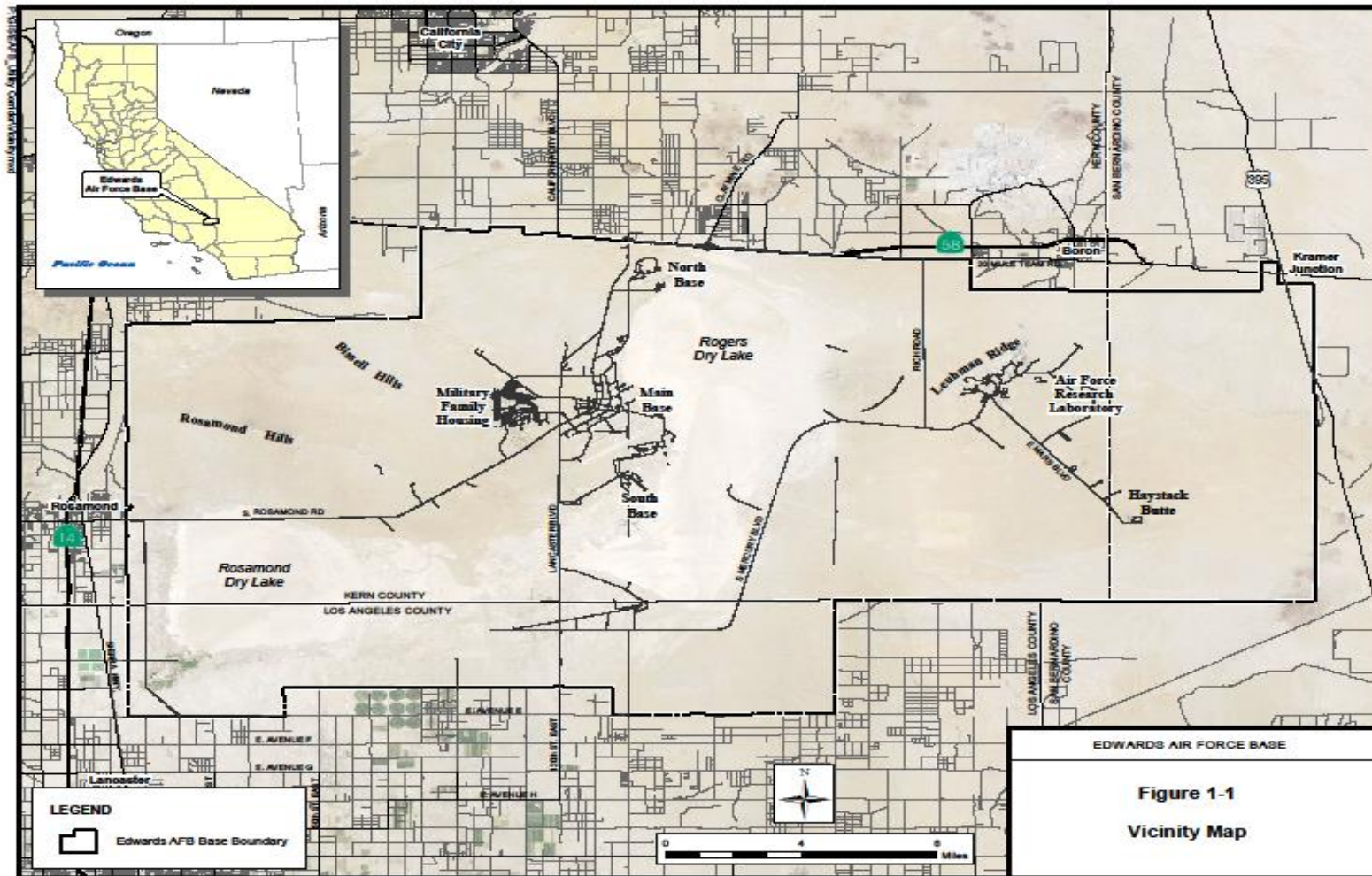


Figure 1-1 Vicinity Map

1.4 ISSUES AND CONCERNS CONSIDERED

During the scoping process, the following issues and concerns were identified as requiring assessment when considering the potential environmental impacts of the alternatives.

- **Air Quality.** Temporary, minor air pollutant emissions (primarily dust) would be generated during construction within each utility corridor.
- **Cultural Resources.** The Base contains numerous cultural resources which could be impacted during construction and operation of the utility corridors. Any proposed project would need to be evaluated for consistency with the existing Programmatic Agreement (PA) between Edwards AFB and the State Historic Preservation Office (SHPO).
- **Geology and Soils.** Construction within the utility corridors has the potential to involve ground-disturbing activities that may create soil erosion.
- **Hazardous Materials and Waste.** The generation, use, handling, transportation and disposal of hazardous materials and hazardous waste may occur as a result of construction activities.
- **Infrastructure.** Potential impacts to existing utilities may occur as a result of ground-disturbing activities.
- **Land Use.** Utility corridor management would be consistent with both mission operations and local/regional plans and development, including the Installation Development Plan.
- **Natural Resources.** Potential impacts to natural habitat may result during construction and operation of utility lines across the Base. Any proposed project would require a detailed evaluation/survey of the area for threatened and endangered species and coordination with the U.S. Fish and Wildlife Service (USFWS) on project-specific actions.
- **Noise.** Construction within the utility corridors has the potential to result in temporary and localized minor noise impacts.
- **Socioeconomics.** Construction of utilities within any of the corridors would result in a temporary, minor increase in employment.
- **Water Resources.** Water may be required during construction within any of the utility corridors for dust suppression.

1.5 ISSUES AND CONCERNS DISCUSSED BUT NOT CONSIDERED RELEVANT FOR FURTHER ANALYSIS

The following issues and concerns were initially considered, but subsequently eliminated from analysis in this EA because they are not applicable to this project or would not result in significant impacts. Consequently, they will not be addressed in Chapters 3 and 4.

- **Airspace.** The proposed utility corridor project would not have any effect on the management or use of the airspace at Edwards AFB or the surrounding area. No utilities would be approved that would have a negative effect on restricted airspace or installation military operating areas.
- **Public Safety/Emergency Services.** Construction of utilities within the corridors should not affect overall public safety at the Base, nor affect emergency services at the Base.
- **Environmental Justice and Protection of Children.** The EOs on Environmental Justice and the protection of children require federal agencies to identify and address disproportionately high adverse effects of their activities on minority and low-income populations and children. Given that the utility corridor construction activities would occur entirely on Edwards AFB, the Air Force has determined that this action would have no substantial, disproportionate impacts on minority and low-income populations and/or children.

1.6 PUBLIC NOTIFICATION PROCESS

Relevant federal and state resource agencies and Native American tribes and local document repositories are on the project mailing list and were sent notification on the development of designated Edwards AFB utility corridors.

This EA was published and made available for a 30-day public review period beginning 3 June 2016 through 5 July 2016. Edwards AFB accepted comments through 5 July 2016. The public had no comments on this EA.

A public meeting was also held at the Mojave Airport on 22 Jun 16. No one from the public attended.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and Alternatives, including the No Action Alternative. The potential environmental impacts for each alternative are summarized in table form at the end of this chapter. The location of the Proposed Action and Alternatives is seven designated utility corridors on Edwards AFB. Initially, nine utility corridor alternatives were evaluated (Figure 2-1), with two eliminated from consideration (Corridors 7 and 8). The seven corridors carried forward for further analysis (Corridors 1, 2, 3, 4, 5, 6, and 9) as well as the No Action alternative, make up the corridor alternatives/Proposed Action (Figure 2-2).

2.1 CRITERIA FOR SELECTION OF A REASONABLE RANGE OF ALTERNATIVES

The criteria established here set the minimum requirements that must be met for an alternative to be considered viable. A more detailed explanation of the process by which the corridors were selected and evaluated with respect to these criteria is provided in the *Utility Corridor Area Development Plan*, in Appendix A (Edwards AFB, 2015). Those alternatives not meeting one or more of the selection criteria have been eliminated from further discussion. Explanation of eliminated alternatives is provided in Section 2.2. Descriptions of each alternative considered, including the No Action Alternative, are provided in Sections 2.3 through 2.10. Alternatives meeting all selection criteria are retained and analyzed in Chapter 4 (Environmental Consequences) of this EA.

The criteria used to select the alternatives discussed in this document are described below. Selection criteria have been separated into three categories: operational criteria which address Air Force operational and mission considerations, technical criteria which address utility purveyor requirements, and environmental criteria which address environmental considerations at Edwards AFB.

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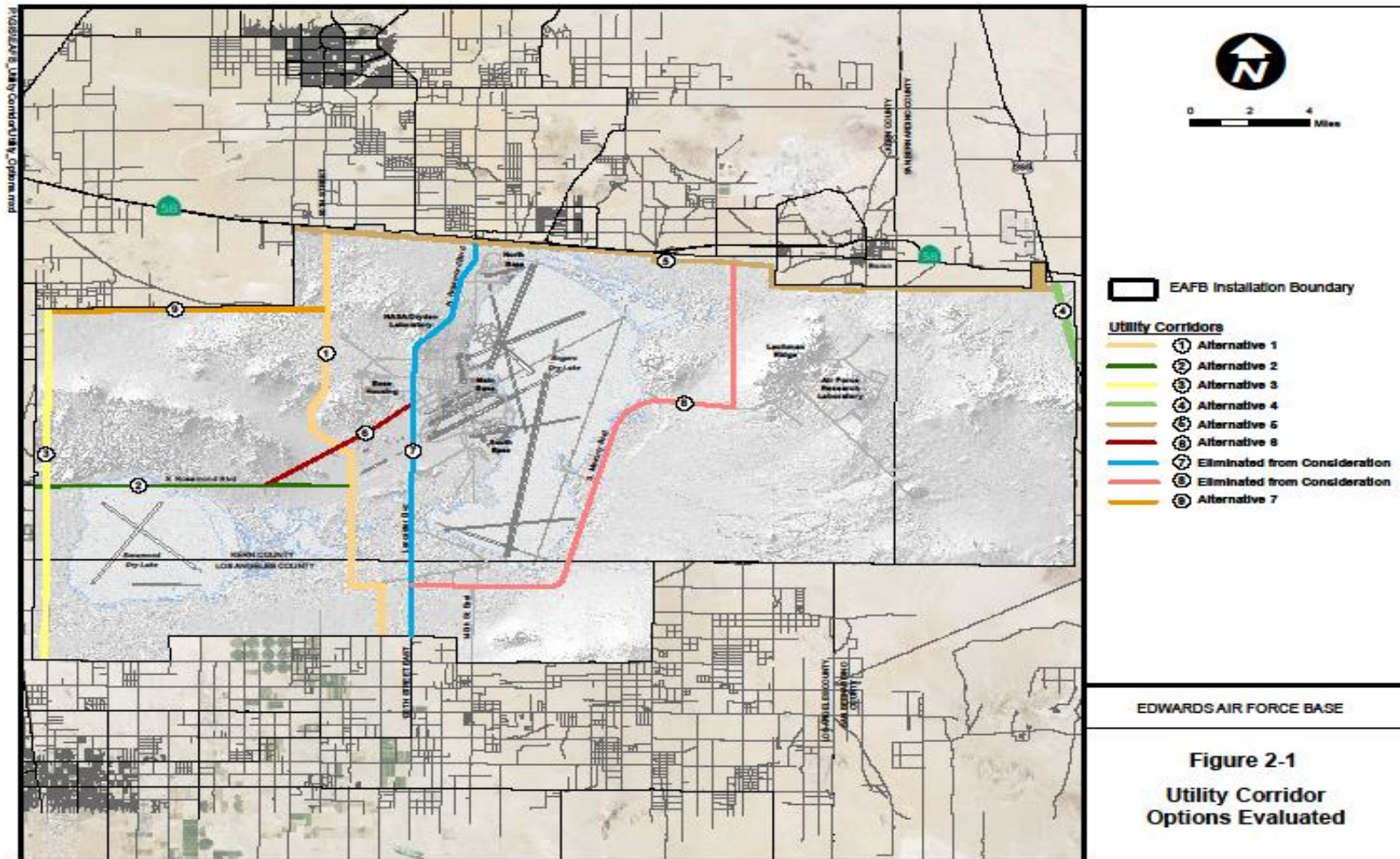


Figure 2-1 Utility Corridor Options Evaluated

Environmental Assessment for Proposed Utility Corridors Edwards Air Force Base, California

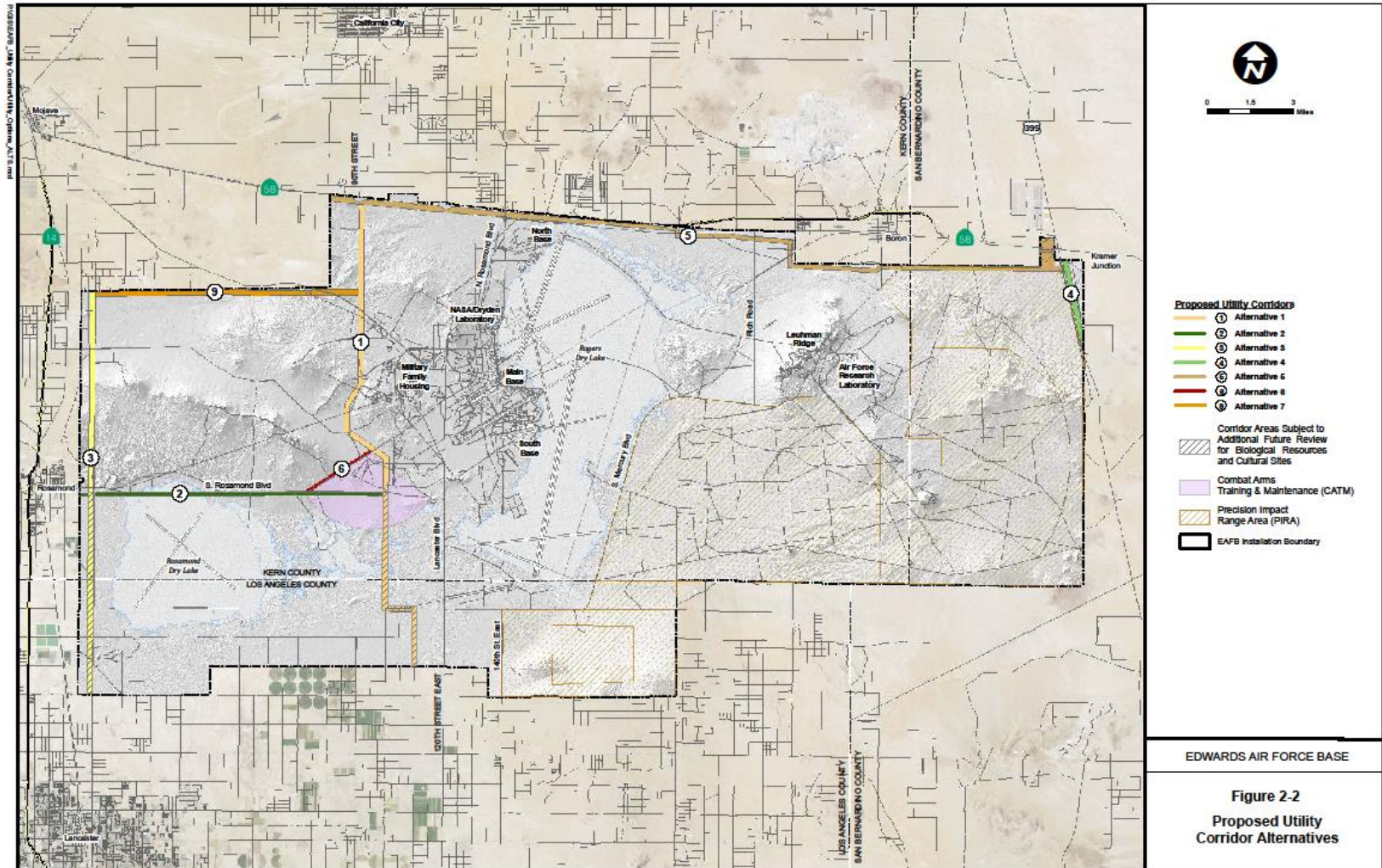


Figure 2-2 Proposed Utility Corridor Alternatives

Operational Criteria

1. Minimize mission encroachment or installation constraints (e.g., flight corridors, spin areas or zones, accident potential zones, range areas, roads and airfield surfaces, vertical height, surface water bodies, radio frequencies [RF], infra-red signature, proximity to ground-based systems land use, etc.).
2. Possibly use corridors as anti-terrorism/force protection boundaries, security zones, fire breaks or fire access roads.
3. Verify compatibility with current and future mission capabilities.

Technical Criteria

1. Identify technical limitations for utility purveyors including cathodic protection for pipelines, underground low-voltage power lines that transvers high-voltage lines, spacing pipelines and different types of power lines.
2. Verify compatibility with existing Base infrastructure and current easement configurations at Edwards AFB.

Environmental Criteria

1. Minimize impacts to sensitive biological and cultural resources, including desert tortoise critical habitat.
2. Minimize impacts to federally-listed species.
3. Eliminate access to potentially hazardous areas.

2.2 ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER CONSIDERATION

Corridors 7 and 8 were considered as part of the ADP planning process but were eliminated from consideration because they did not meet the selection criteria noted in Section 2.1. The two eliminated alternatives are described in this section.

2.2.1 Corridor 7

This route runs along Lancaster Boulevard from the South Base boundary to North Base boundary. It is over 16 miles in length and 1,000 feet wide (about 1,939 acres). This route

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passes through the heart of the installation. This corridor would have over 40 existing utility/infrastructure crossings, to include fuels and natural gas. Crossings are highly undesirable and would be extremely costly to install, thereby making this corridor unsuitable for development.

In addition, above ground poles and towers could have potential range impacts depending on height, type of utility and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include (at a minimum) information on transmission characteristics, power and frequencies.

This alternative was also eliminated due to its proximity to the Camacho Reverse Drop Zone (DZ). This DZ, located west of Lancaster Boulevard in the Los Angeles County portion of the Base, is used on a fairly routine basis in support of both 412 TW missions as well as Air National Guard sorties. Container Delivery System (CDS) bundles are dropped from C-130 aircraft on this DZ with short scheduling notifications from time to time. Close coordination with Airfield Management and Range would be critical.

Corridor 7 is in the departure pattern for the main runway and is, therefore, not suitable for a new utility corridor.

In particular, the Corridor 7 alternative would not meet operational criteria 1 and 3, which are to minimize mission encroachment or installation constraints; nor would it meet technical selection criteria 1 and 2, which are to identify technical limitations for utility purveyors and verify compatibility with current utility easements on the Base. Due to these constraints, this corridor was eliminated from further consideration.

In addition, there were a number of potential environmental resource impacts. There is at least one National Register of Historic Places (NRHP)-eligible site within this proposed route and a number of sites that have not been evaluated. The route also crosses desert tortoise and mesquite habitat and burrowing owl areas.

2.2.2 Corridor 8

The Mercury Boulevard route parallels current roadways which bounds the Precision Impact Range Area (PIRA). This corridor is approximately 25 miles in length and 1,000 feet wide (about 3,030 acres).

Mercury Boulevard from 140th Street east to the Rich Road intersection serves as a critical boundary for safety mitigation and mission support. Mercury Boulevard is also used to provide a sterile environment for Time-Space-Position Information instrumented ground vehicles to traverse at moderate speeds as a ground target for Electro-Optical and Radar sensor flights. Mercury Boulevard closures and west range missions (mostly inert weapon drops and non-eye-safe laser operations) are routinely conducted. The PIRA supports over six missions daily and must have a sterile environment. Just the utility-related trenching and personnel presence could impact the daily high-tempo operations, thereby making this corridor unsuitable for development.

Above-ground poles or towers could also be very intrusive to range operations in that low-level approaches to the west gunnery ranges could pose a safety hazard. Further, any construction to the north/west of the current road may encounter Unexploded Ordnance (UXO); also to the south/east of the road is an active range area also subjected to potential UXOs. This would be the least desirable for the Range Squadron and pose the greatest encroachment to the 412 TW mission.

The Corridor 8 alternative would not meet operational criteria 1 and 3, which are to minimize mission encroachment or installation constraints; nor would it meet technical selection criteria 1 and 2, which are to identify technical limitations for utility purveyors and verify compatibility with current utility easements on the Base. Due to these constraints, this corridor was eliminated from further consideration.

In addition, there were a number of potential environmental resource impacts. There are several NRHP-eligible sites within this proposed route as well as a number of sites that have not been

evaluated. The route also crosses desert tortoise, Mohave ground squirrel and mesquite habitat and several sensitive plant areas.

2.3 ALTERNATIVE 1: CORRIDOR 1

This utility corridor spans from the Southern Base boundary (120th Street East) to the northern boundary. It is approximately 20 miles long, by 1,000 feet wide (about 2,424 acres). The corridor follows the natural contours of the terrain and avoids large and tall land masses.

There is some concern with this option as it relates to its proximity to the Camacho Reverse DZ and the Rowe East and West DZs immediately south of the Camacho Reverse DZ at the southern portion of the Base, west of Lancaster Boulevard. The Camacho Reverse DZ is used on a fairly routine basis in support of both Air Force (AF) test missions as well as Air National Guard sorties. CDS bundles are dropped from C-130 aircraft on this DZ with short scheduling notifications from time to time. Close coordination with Airfield Management and Range would be important. Underground power transmission, gas, water or fiber would have no impact on the Range Squadron or 412 TW mission in this location. Though newly designated as drop zones, the Rowe East and West DZs have not yet been prepared or activated for use. Activation will occur at some future date.

In addition, above-ground poles or towers could have potential range impacts depending on height, type of utility and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include, at a minimum, information on transmission characteristics, power and frequencies. This utility corridor area also crosses the Combat Arms Training and Maintenance (CATM) firing range area which is of concern for the construction phase of any project.

This proposed utility corridor passes through NRHP-eligible sites and crosses desert tortoise, burrowing owl, mesquite habitat and biological wetlands. This corridor also crosses the Los Angeles County-designated Antelope Valley Significant Ecological Area (SEA). The portion of Corridor 1 north of Rosamond Boulevard has fewer sensitive natural and cultural resources than the southern portion. In general, impacts to cultural/natural resources would be

avoided/minimized by limiting the degree or magnitude of the action taking place and/or by consultation with the SHPO, Native American Tribes and USFWS. At a future time when a specific utility project is proposed, a Finding of No Practicable Alternative (FONPA) may be required for crossing any biological wetlands. The SEA and wetlands issues are discussed in more detail in Section 3.7, Natural Resources, and Section 3.10, Water Resources.

Suitable utilities for Corridor 1 include underground gas, water, communication, electric or power transmission lines.

2.4 ALTERNATIVE 2: CORRIDOR 2

This utility corridor begins at the western boundary of the Base at Rosamond Boulevard and runs parallel to Rosamond Boulevard. It is approximately 12 miles long and is 500 feet wide (about 727 acres) in order to maintain the integrity of the dry lake bed. The corridor crosses the CATM firing fan, terminating at the intersection point of Corridor 1. Although Corridor 2 crosses the CATM firing fan, it does follow an existing communications infrastructure utility corridor in the area.

Above-ground poles or towers could have potential range impacts depending on height, utility type and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include, at a minimum, information on power, transmission characteristics and frequencies. The Range Squadron routinely transports data (telemetry, voice and video) from Point Mugu, China Lake, Palmdale, Nellis ranges, White Sands Missile Range and Vandenberg AFB, so any RF in proximity to microwave systems would have to be analyzed by the 412 TW Spectrum Office to assess vulnerability.

The Range Squadron manages radar reflector arrays on the Rosamond Dry Lakebed. The south side of the Rosamond Dry Lakebed has a DZ. Dry lakebeds serve as emergency landing areas as well as unimproved landing strip testing sites. Any access or potential impact should be well coordinated with the Operation Support Squadron and Airfield Management. Underground power transmission, gas, water or fiber would have no impact on the Range Squadron or 412 TW mission in this location.

From an environmental perspective, this utility corridor area contains two NRHP-eligible sites, and also crosses a 100-year floodplain, desert tortoise habitat and a burrowing owl area. However, impacts to cultural/natural resources would be avoided/minimized by limiting the degree or magnitude of the action taking place and/or by consultation with the SHPO, Native American Tribes and USFWS. A FONPA is required to cross the 100-year floodplain and is provided as part of this EA.

Suitable utilities for Corridor 2 include buried communication, electric, transmission and water lines.

2.5 ALTERNATIVE 3: CORRIDOR 3

This utility corridor, also known as the Shuttle Road Corridor, follows Shuttle Road at the western-most edge of the Base from Avenue E to the south, to the northern boundary of the Base at Trotter Road. The corridor is approximately 15.5 miles in length and 1,000 feet wide (about 1,879 acres).

This proposed utility corridor area passes through the Piute Ponds Complex, NRHP-eligible sites and a number of cultural sites that have not been evaluated. This corridor also crosses the Los Angeles County-designated Antelope Valley SEA. The portion of Corridor 3 north of Rosamond Boulevard has fewer sensitive natural and cultural resources than the southern portion. In general, impacts to cultural/natural resources would be avoided/minimized by limiting the degree or magnitude of the action taking place and/or by consultation with the SHPO, Native American Tribes and USFWS. At a future time when a specific utility project is proposed, a FONPA may be required for crossing any biological wetlands, such as those at the Piute Ponds Complex. The SEA and wetlands issues are discussed in more detail in Section 3.7, Natural Resources, and Section 3.10, Water Resources.

Above ground poles and towers could have potential range impacts depending on height, type utility and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include, at a minimum, information on power, transmission characteristics and frequencies. Underground gas, water, communication, electric

or power transmission lines would have no impact on the Range Squadron or 412 TW mission in this location.

Suitable utilities for Corridor 3 include underground gas, water, communication, electric or power transmission lines.

2.6 ALTERNATIVE 4: CORRIDOR 4

This utility corridor traverses the north eastern corner of the Base, paralleling U.S. Route 395 and remains to the east of the eastern edge of the PIRA and on the east side of Highway 395. The corridor is approximately 2 miles in length and 1,000 feet wide (about 242 acres).

To the west of the utility corridor area is the active range area, where there is a potential for UXO, so any construction in this area may encounter UXO.

There are currently no known issues or concerns for range operations with the Corridor 4 area. However, there may be some future concerns should the AF consider Hawes Field to the east of the Installation as a potential small unmanned aircraft system (UAS) test area, in which case any poles or towers could cause an intrusion for ingress and egress to and from the east PIRA.

From a cultural resource perspective, there are few known concerns in this corridor and the corridor does cross critical desert tortoise habitat. However, impacts to cultural/natural resources would be avoided/minimized by limiting the degree or magnitude of the action taking place and/or by consultation with the SHPO, Native American Tribes and USFWS.

Suitable utilities for Corridor 4 include buried communication, electric, transmission and water lines.

2.7 ALTERNATIVE 5: CORRIDOR 5

This utility corridor begins at the northern boundary of the Base, parallels State Route (SR) 58, and terminates at the north eastern corner of the Base at Kramer Junction. It is approximately 30 miles long and is 1,000 feet wide (about 3,636 acres). This utility corridor follows other active easements and provides for minimum impact to the future mission of the installation.

Caution would need to be exercised on the east end from Rich Road to the Four Corners area (where U.S. 395 and SR 58 intersect). Aircraft performing bombing and laser missions on the east range perform the run-in to the targets from the north to the South often at low altitudes. It is imperative that there are no high towers along SR 58, which could cause a targeting solution problem as well as safety of flight issues.

This proposed utility corridor passes through NRHP-eligible sites and a number of sites that have not been evaluated. This utility corridor also crosses desert tortoise and Mohave ground squirrel habitat. However, impacts to cultural/natural resources would be avoided/minimized by limiting the degree or magnitude of the action taking place and/or by consultation with the SHPO, Native American Tribes and USFWS.

Suitable utilities for Corridor 5 include buried communication, electric, transmission and water lines.

2.8 ALTERNATIVE 6: CORRIDOR 6

This utility corridor runs from mid-Rosamond Boulevard and connects to either Corridor 1 or Corridor 2. It is nearly 4 miles long depending on the terminus and 500 feet wide (about 242 acres).

Since Corridor 6 is close to or along the same path as existing lines, the Range Squadron would not have any issue with this utility corridor area. However, this utility corridor area is in the departure pattern for the main runway and therefore only underground utilities should be considered. Underground power transmission, gas, water or fiber would have no impact on the Range Squadron or 412 TW mission in this location.

Above-ground poles or towers could have potential range impacts depending on height, type of utility and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include information on power, transmission characteristics and frequencies at a minimum. The Range Squadron transports data (telemetry, voice and video) from Point Mugu, China Lake, Palmdale, Nellis AFB ranges, White Sands

Missile Range and Vandenberg AFB routinely, so any RF in proximity to the microwave systems would have to be analyzed by the 412 TW Spectrum Office to assess vulnerability.

From a cultural/natural resource perspective, there are few known concerns in this corridor, however, the corridor does cross desert tortoise habitat and burrowing owl areas. Impacts to cultural/natural resources would be avoided/minimized by limiting the degree or magnitude of the action taking place and/or by consultation with the SHPO, Native American Tribes and USFWS.

Suitable utilities for Corridor 6 include buried communication, electric, transmission and water lines.

2.9 ALTERNATIVE 7: CORRIDOR 9

This utility corridor is the northwestern connection from the northwestern edge of the Base to tie into Corridor 1. This utility corridor area would allow for connectivity to the northwest corner of the base. This corridor is nearly 11 miles in length and 1,000 feet wide (about 1,333 acres).

There is at least one NRHP-eligible site within this proposed utility corridor and a number of sites that have not been evaluated. This utility corridor also crosses desert tortoise habitat. However, impacts to cultural/natural resources would be avoided/minimized by limiting the degree or magnitude of the action taking place and/or by consultation with the SHPO, Native American Tribes and USFWS.

Above ground poles or towers could impact telemetry or RF propagation. No other range operation impacts are known at this time.

Suitable utilities for Corridor 9 include buried communication, electric, transmission and water lines.

2.10 ALTERNATIVE 8: NO ACTION ALTERNATIVE

The CEQ regulations require inclusion of a No Action Alternative in an EA. The No Action

Alternative serves as a baseline against which the impacts of the Proposed Action and Alternatives can be evaluated.

Under the No Action Alternative (Alternative 8), the Air Force would not provide for designated utility corridors, but would use existing routes or new, undesignated utility routes. New utility routes would continue to be considered on a case-by-case basis. Each new utility route would be required to assess all constraints, thus duplicating efforts for each new utility route being proposed. Status quo designation would continue to occur on a case-by-case basis and would result in potential redundant expenditure of time and effort to repeatedly analyze similar issues/constraints without integrated coordination and appropriate review. The No Action Alternative would allow for limited utility route widths, rather than the wider widths identified in the routes that comprise the Proposed Actions and Alternatives.

2.11 SUMMARY OF ENVIRONMENTAL IMPACTS

Table 2-1 presents a summary of anticipated environmental impacts for all alternatives. Table 2-2 presents a compilation of the avoidance and minimization measures proposed to reduce impacts to a level that is not significant.

Table 2-1 Summary of Potential Environmental Impacts

Resource	Alternative 1 Corridor 1	Alternative 2 Corridor 2	Alternative 3 Corridor 3	Alternative 4 Corridor 4	Alternative 5 Corridor 5	Alternative 6 Corridor 6	Alternative 7 Corridor 9	Alternative 8 No Action
Air Quality & Greenhouse Gases	Emissions would be below <i>de minimis</i> and significance thresholds and would not be expected to have a significant impact on the environment. Implementation of Mitigation Measures (MM) MM AIR-1 through MM AIR-13 would further reduce impacts to ensure that impacts remain less than significant.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	No impacts would occur.
Cultural & Paleontological Resources	Previous cultural resources surveys identified 65 archaeological sites (15 prehistoric and 50 historic period); 11 of these sites are considered significant (EAFB-79, EAFB-90, EAFB-100, EAFB-105, EAFB-108, EAFB-199, EAFB-206, EAFB-423, EAFB-854, EAFB-1000, and EAFB-3051). Implementation of MM CUL would ensure that impacts would not be significant.	Previous cultural resources surveys identified 22 archaeological sites (4 prehistoric and 18 historic period); 2 of these are considered significant (EAFB-36 and EAFB-100). Implementation of MM CUL would ensure that impacts would not be significant.	Previous cultural resources surveys identified 83 archaeological sites (33 prehistoric, 49 historic period, and one submodern); 13 of these are considered significant (EAFB-7, EAFB-8, EAFB-31, EAFB-34, EAFB-238, EAFB-835, EAFB-951, EAFB-1178, EAFB-1717, EAFB-3010, EAFB-3302, EAFB-4188, and EAFB-6083). Implementation of MM CUL would ensure that impacts would not be significant.	Previous cultural resources surveys identified 11 archaeological sites (7 prehistoric and 4 historic period); 1 of these is considered significant (EAFB-558). Implementation of MM CUL would ensure that impacts would not be significant.	Previous cultural resources surveys identified 106 archaeological sites (46 prehistoric and 60 historic period); 3 of these are considered significant (EAFB-216, EAFB-579, and EAFB-596). Implementation of MM CUL would ensure that impacts would not be significant.	Previous cultural resources surveys identified 5 archaeological sites (2 prehistoric and 3 historic period); 1 of these is considered significant (EAFB-6123). Implementation of MM CUL would ensure that impacts would not be significant.	Previous cultural resources surveys identified 53 archaeological sites (34 prehistoric, 15 historic period, and 4 submodern); 2 of these are considered significant (EAFB-562 and EAFB-845). Implementation of MM CUL would ensure that impacts would not be significant.	No impacts would occur.
Geology & Soils	Construction would not damage existing landforms. New utilities could be affected by a seismic event. Most of Corridor 1 has high potential for soil loss	Construction would not damage existing landforms. New utilities could be affected by a seismic event. Corridor 2 has high potential for soil loss due to wind	Construction would not damage existing landforms. New utilities could be affected by a seismic event. The southern portion of Corridor 3 may be subject to	Construction would not damage existing landforms. New utilities could be affected by a seismic event. Corridor 4 has high potential for soil loss due to wind	Construction would not damage existing landforms. New utilities could be affected by a seismic event. Corridor 5 has high potential for soil loss due to wind	Construction would not damage existing landforms. New utilities could be affected by a seismic event. Corridor 6 has high potential for soil loss due to wind	Construction would not damage existing landforms. New utilities could be affected by a seismic event. Corridor 9 has high potential for soil loss due to wind erosion during	No impacts would occur.

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Resource	Alternative 1 Corridor 1	Alternative 2 Corridor 2	Alternative 3 Corridor 3	Alternative 4 Corridor 4	Alternative 5 Corridor 5	Alternative 6 Corridor 6	Alternative 7 Corridor 9	Alternative 8 No Action
	due to wind erosion during construction and very high potential for soil loss due to sheet flow erosion. Implementation of MM GEO-1, MM GEO-2, MM GEO-3, MM GEO-4, and MM AIR-12 would ensure that impacts would not be significant.	erosion during construction and very high potential for soil loss due to sheet flow erosion. Implementation of MM GEO-1, MM GEO-2, MM GEO-3, MM GEO-4, and MM AIR-12 would ensure that impacts would not be significant.	liquefaction. Corridor 3 has high potential for soil loss due to wind erosion during construction and very high potential for soil loss due to sheet flow erosion. Implementation of MM GEO-1, MM GEO-2, MM GEO-3, MM GEO-4, and MM AIR-12 would ensure that impacts would not be significant.	erosion during construction and very high potential for soil loss due to sheet flow erosion. Implementation of MM GEO-1, MM GEO-2, MM GEO-3, MM GEO-4, and MM AIR-12 would ensure that impacts would not be significant.	erosion during construction and very high potential for soil loss due to sheet flow erosion. Implementation of MM GEO-1, MM GEO-2, MM GEO-3, MM GEO-4, and MM AIR-12 would ensure that impacts would not be significant.	erosion during construction and very high potential for soil loss due to sheet flow erosion. Implementation of MM GEO-1, MM GEO-2, MM GEO-3, MM GEO-4, and MM AIR-12 would ensure that impacts would not be significant.	construction and high potential for soil loss due to sheet flow erosion. Implementation of MM GEO-1, MM GEO-2, MM GEO-3, MM GEO-4, and MM AIR-12 would ensure that impacts would not be significant.	
Hazardous Materials & Hazardous Waste	Construction would not mobilize existing contaminants in groundwater or soil, or expose workers to contaminated soils or groundwater exceeding those permitted by federal and state law. Construction would require the use of minor amounts of hazardous materials. Implementation of MM HAZ would ensure that impacts would not be significant.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	No impacts would occur.
Infrastructure	Construction and operation would not affect existing utilities at Edwards AFB, but has the potential to affect the Air Force mission. Implementation of MM INF would ensure that impacts would not be significant.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	No impacts would occur.
Land Use	Construction and operation would not affect existing land use	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	No impacts would occur.

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Resource	Alternative 1 Corridor 1	Alternative 2 Corridor 2	Alternative 3 Corridor 3	Alternative 4 Corridor 4	Alternative 5 Corridor 5	Alternative 6 Corridor 6	Alternative 7 Corridor 9	Alternative 8 No Action
	at Edwards AFB, but has the potential to affect the Air Force mission. Implementation of MM INF would ensure that impacts would not be significant.							
Natural Resources	Direct and indirect impacts could occur to vegetation communities which include mesquite woodland (5.0 acres), saltbush scrub (1,612.2 acres), and creosote bush scrub (571.2 acres). Impacts may also occur to wildlife communities, including desert tortoise and Mohave ground squirrel. Special-status plants have been mapped within or adjacent to this corridor. Wildlife species that may be impacted include the American badger, special status bat species, burrowing owl, desert tortoise, desert horned lizard, golden eagle, LeConte's thrasher, loggerhead shrike, Mohave ground squirrel, mountain plover, northern harrier, and prairie falcon. Implementation of MM NAT-1 through MM NAT-18 would reduce impacts to ensure that	Direct and indirect impacts could occur to vegetation communities which include saltbush scrub (285.9 acres), playa/claypan (145.1 acres), and creosote bush scrub (208.7 acres). Impacts to wildlife communities and wildlife species are the same as for Alternative 1. Special-status plants have also been mapped within or adjacent to this corridor. Implementation of MM NAT-1 through MM NAT-18 would reduce impacts to ensure that impacts remain less than significant.	Direct and indirect impacts could occur to vegetation communities which include saltbush scrub (1,231.6 acres) and creosote bush scrub (473.5 acres). Impacts to wildlife communities and wildlife species are the same as for Alternative 1, with the addition of tricolored blackbird and western snowy plover (associated with the Piute Ponds Complex). Special-status plants have also been mapped within or adjacent to this corridor. Implementation of MM NAT-1 through MM NAT-18 would reduce impacts to ensure that impacts remain less than significant.	Direct and indirect impacts could occur to saltbush scrub (2.5 acres), creosote bush scrub (312.5 acres), and Joshua tree woodland (27.6 acres) habitat. Impacts may also occur to wildlife communities. Impacts to wildlife communities and wildlife species are the same as for Alternative 1. Special-status plants have also been mapped within or adjacent to this corridor. Implementation of MM NAT-1 through MM NAT-18 would reduce impacts to ensure that impacts remain less than significant.	Direct and indirect impacts could occur to vegetation communities which include saltbush scrub (1,093.3 acres), Joshua tree woodland (712.3 acres), playa/claypans (137.0 acres) and creosote bush scrub (705.7 acres). Impacts to wildlife communities and wildlife species are the same as for Alternative 1. Special-status plants have also been mapped within or adjacent to this corridor. Implementation of MM NAT-1 through MM NAT-18 would reduce impacts to ensure that impacts remain less than significant.	Direct and indirect impacts could occur to vegetation communities which includes creosote bush scrub habitat (271.8 acres). Impacts to wildlife communities and wildlife species are the same as for Alternative 1. Special-status plants have also been mapped within or adjacent to this corridor. Implementation of MM NAT-1 through MM NAT-18 would reduce impacts to ensure that impacts remain less than significant.	Direct and indirect impacts could occur to vegetation communities which include saltbush scrub (884.7 acres) and Joshua tree woodland (215.9 acres). Impacts to wildlife communities and wildlife species are the same as for Alternative 1. Special-status plants have also been mapped within or adjacent to this corridor. Implementation of MM NAT-1 through MM NAT-18 would reduce impacts to ensure that impacts remain less than significant.	No impacts would occur.

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Resource	Alternative 1 Corridor 1	Alternative 2 Corridor 2	Alternative 3 Corridor 3	Alternative 4 Corridor 4	Alternative 5 Corridor 5	Alternative 6 Corridor 6	Alternative 7 Corridor 9	Alternative 8 No Action
	impacts remain less than significant.							
Noise	Noise impacts resulting from the operation of construction equipment would be short-term; no long-term impacts are anticipated. The operation of construction equipment during excavation/earth moving would produce elevated noise levels in the immediate vicinity of the site. The nearest sensitive receptor to Corridor 1 is about 0.9 mile from the west end of the family housing area on the Base. Even though impacts would not be significant, implementation of MM INF would ensure that impacts would not be significant.	Noise impacts resulting from the operation of construction equipment would be short-term; no long-term impacts are anticipated. The operation of construction equipment during excavation/earth moving would produce elevated noise levels in the immediate vicinity of the site. Even though impacts would not be significant, implementation of MM INF would ensure that impacts would not be significant.	Noise impacts resulting from the operation of construction equipment would be short-term; no long-term impacts are anticipated. The operation of construction equipment during excavation/earth moving would produce elevated noise levels in the immediate vicinity of the site. The nearest sensitive receptor to Corridor 3 is about 0.9 mile from the nearest residences in Rosamond (off-base). Even though impacts would not be significant, implementation of MM INF would ensure that impacts would not be significant.	Same as Alternative 2.	Noise impacts resulting from the operation of construction equipment would be short-term; no long-term impacts are anticipated. The operation of construction equipment during excavation/earth moving would produce elevated noise levels in the immediate vicinity of the site. The nearest sensitive receptor to Corridor 5 is about 3,000 feet from a school north of the Base. Even though impacts would not be significant, implementation of MM INF would ensure that impacts would not be significant.	Same as Alternative 2.	Same as Alternative 2.	No impacts would occur.
Socioeconomics	Socioeconomic impacts resulting from construction and installation activities would result in a temporary beneficial increase in local employment and the use of local goods and services and would be short-term; no long-term impacts are anticipated. No significant impacts are expected and no mitigation is required.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	No impacts would occur.
Water Resources	The southern portion of Corridor 1 crosses a portion of the playa	The western portion of Corridor 2 crosses the northern portion of	Corridor 3 would not bisect any dry lake beds or other designated	Corridor 4 does not bisect any dry lake beds or other designated	Corridor 5 does not bisect any dry lake beds or other designated	Corridor 6 does not bisect any dry lake beds or other designated	A small portion the northern section of Corridor 9 would cross	No impacts would occur.

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Resource	Alternative 1 Corridor 1	Alternative 2 Corridor 2	Alternative 3 Corridor 3	Alternative 4 Corridor 4	Alternative 5 Corridor 5	Alternative 6 Corridor 6	Alternative 7 Corridor 9	Alternative 8 No Action
	complex associated with Buckhorn Dry Lake, which has not been delineated as a 100-year floodplain, although it is in a flood prone area. However, no increase in flooding hazards or impacts associated with flooding are expected. A small portion the northern section of Corridor 1 would cross Mojave Creek which has not been delineated as a 100-year floodplain; however, construction of this portion of the corridor within Mojave Creek has the potential for increasing down-stream flooding hazards. Unnamed ephemeral drainages are also bisected by this alternative; construction has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area. Implementation of MM HYD-1 and MM HYD-2 would ensure that impacts would not be significant.	Rosamond Dry Lake which has been identified as a 100-year floodplain. This alternative has the potential for increasing flooding hazards in the area. Unnamed ephemeral drainages are also bisected by this alternative; construction has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area. Implementation of MM HYD-1 and MM HYD-2 would ensure that impacts would not be significant.	100-year floodplains although the southern portion of Corridor 3 is within a flood prone area. Unnamed ephemeral drainages are also bisected by this alternative; construction has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area. Implementation of MM HYD-2 would ensure that impacts would not be significant.	100-year floodplains. No increase in flooding hazards would occur. Unnamed ephemeral drainages are also bisected by this alternative; construction has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area. Implementation of MM HYD-2 would ensure that impacts would not be significant.	100-year floodplains. No increase in flooding hazards would occur. Unnamed ephemeral drainages are also bisected by this alternative; construction has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area. Implementation of MM HYD-2 would ensure that impacts would not be significant.	100-year floodplains. No increase in flooding hazards would occur. Unnamed ephemeral drainages are also bisected by this alternative; construction has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area. Implementation of MM HYD-2 would ensure that impacts would not be significant.	Mojave Creek which has not been delineated as a 100-year floodplain; however, construction of this portion of the corridor within Mojave Creek has the potential for increasing down-stream flooding hazards. Unnamed ephemeral drainages are also bisected by this alternative; construction has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area. Implementation of MM HYD-1 and MM HYD-2 would ensure that impacts would not be significant.	

Table 2-2 Summary of Minimization Measures

Resource	Measures to Minimize or Reduce Impacts
Air Quality & Greenhouse Gases	<p>MM AIR-1: Project activities shall comply with all applicable rules and regulations as identified in AFI 32-7040, <i>Air Quality Compliance and Resource Management</i> (2007).</p> <p>MM AIR-2: The project shall comply with all applicable EKAPCD, MDAQMD or AVAQMD rules and regulations and obtain the necessary air quality permits. Emissions from permitted devices and activities must be tracked and reported to the CARB, the appropriate air district and the U.S. EPA. Air quality permits, if required, shall be coordinated through the Environmental Management Division. The Environmental Management Division is the lead agency for the application and maintenance of air quality permits on Edwards AFB. Very few, if any, air quality permits would be required for this project as the majority of emissions will be due to mobile sources.</p> <p>MM AIR-3: Any internal combustion engine subject to NESHAP or New Source Performance Standards requirements must be permitted by the local AQMD/APCD. Based on recent revisions to the Reciprocating Internal Combustion Engine NESHAP, all stationary generators are now subject to the regulation regardless of size – this in turn makes them subject to permitting requirements. Permitting is also required (retroactively) for any non-road engine that fails the indicia of portability (i.e., exceeds the 12-month time limit). If such equipment is to remain on base less than 45 calendar days, a written exemption must be obtained from the local air agency.</p> <p>MM AIR-4: The proposed project shall not discharge from any source whatsoever, such quantities of air contaminants or other material that would: cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public; endanger the comfort, repose, health or safety of any such persons or the public; or cause or have a natural tendency to cause injury or damage to business or property.</p> <p>MM AIR-5: All earthwork activities shall be planned and conducted to minimize the duration that soils would be left unprotected. The extent of the area of disturbance necessary to accomplish the project shall be minimized. Exposed surfaces shall be periodically sprayed with water.</p> <p>MM AIR-6: Visible emissions (e.g., dust or smoke) from the proposed projects shall not exceed the limitations as outlined by the local air district.</p> <p>MM AIR-7: Apply water or dust suppressants to roads and open areas where dust is being generated. If winds produce excessive visible emissions, erect wind barriers. Do not grade or till compacted dirt without applying water or dust suppressant.</p> <p>MM AIR-8: Discontinue grading and other ground-disturbing activities at wind speeds exceeding 25 miles per hour.</p> <p>MM AIR-9: All vehicles transporting fill material or debris shall be covered to reduce PM_{2.5} and PM₁₀ emissions during transport.</p> <p>MM AIR-10: Temporary coverings must be installed over open storage piles.</p> <p>MM AIR-11: All mechanical and construction equipment shall be kept in good working order according to applicable technical orders and the manufacturer’s equipment maintenance manuals to reduce emissions to acceptable levels.</p> <p>MM AIR-12: The following dust control measures will be implemented during land preparation (i.e., clearing, grading, etc.), excavation and/or post-construction:</p> <ul style="list-style-type: none">• All soil excavated or graded should be sufficiently watered to prevent excessive dust. Watering should occur as needed with complete coverage of disturbed soil areas. Watering should be a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations.• All clearing, grading, earth moving and excavation activities shall cease during periods of winds greater than 20 miles per hour (mph) (averaged over one hour), if disturbed material is easily windblown or when dust plumes of 20% or greater opacity impact public roads, occupied structures or neighboring property.• All fine material transported off site should be either sufficiently watered or securely covered to prevent excessive dust.• All haul trucks should be required to exit the site via an access point where a gravel pad or grizzly has been installed.• Stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.• Once clearing or grading has ceased, all inactive soil areas within the project area shall either be seeded and watered until plant growth is evident, treated with a dust

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	<p>palliative or watered twice daily until soil has sufficiently crusted to prevent fugitive dust emission.</p> <ul style="list-style-type: none"> On-site vehicle speed should be limited to 15 mph. All areas with vehicle traffic should be paved, treated with dust palliatives or watered a minimum of twice daily. Streets adjacent to the project site should be kept clean and accumulated silt removed. Revegetation/restoration shall be required based on the level of disturbance created from project activities. Revegetation/restoration shall be in accordance with the <i>Edwards Air Force Base Revegetation Plan</i> (AFFTC/EM 1994). <p>MM AIR-13: The following measures should be implemented to control construction vehicle tailpipe emissions:</p> <ul style="list-style-type: none"> Properly maintain and tune all internal combustion engine powered equipment; Require employees and subcontractors to comply with the ARB idling restrictions for compression ignition engines; and Use CARB diesel fuel.
Cultural Resources	<p>MM CUL: Avoidance is the preferred treatment for NRHP-eligible cultural resources. If avoidance is not possible, then resources will need to be evaluated prior to any development and construction along a proposed corridor, and any potentially NRHP-eligible resources will require resolution of the adverse effects. Construction monitoring may be implemented in areas where subsurface cultural resources are anticipated. Additional site-specific mitigation may be implemented prior to developing the selected corridor.</p>
Geology and Soils	<p>MM GEO-1: Prior to final design of the Alternative, a combined geotechnical engineering and engineering geology study should be conducted by a qualified geologist/engineer to identify site-specific geologic conditions and potential geologic hazards in sufficient detail to support sound engineering. Appropriate mitigations for identified geological hazards would be identified in the geotechnical study</p> <p>MM GEO-2: Prepare and implement a construction SWPPP prior to the commencement of soil disturbance activities associated with construction.</p> <p>MM GEO-3: Use non-hazardous dust suppression palliatives approved by Edwards AFB and water on an as-needed basis to suppress wind-blown dust generated at the site during construction. Dust suppression palliatives are materials that work by either agglomerating the fine particles, adhering/binding the surface particles together, or increasing the density of the surface material.</p> <p>MM GEO-4: Implement erosion control measures during construction, including stabilization of construction areas, employing a concrete wash out area, as needed, and tire washes near the entrance to existing roadways.</p> <p>MM GEO-5: Use silt fences for erosion control in the event of a storm event.</p> <p>In addition, implementation of MM AIR-12 (addressing dust-control as described for Air Quality) would further reduce erosion-related impacts.</p>
Hazards and Hazardous Materials	<p>MM HAZ: Prior to construction activities, a health and safety plan in compliance with 29 CFR 1910.120 will be prepared and approved by Edwards AFB. The site-specific health and safety plan will address all site-specific safety and environmental hazards that have the potential to be encountered during construction of the alternative, including physical hazards, biological hazards, and general safety hazards. Any training required by construction personnel will be identified.</p>
Infrastructure	<p>MM INF: Prior to final design selection, coordination will be required for current and future Air Force mission to ensure that the design does not cause conflict.</p>
Land Use	<p>MM INF as described for infrastructure</p>
Natural Resources	<p>MM NAT-1: Provide a worker environmental awareness program (WEAP) to all individuals that will be working on the project in the field (USFWS, 2014; EAFB, 2008).</p>

Resource	Measures to Minimize or Reduce Impacts
	<p>This program may consist of videos, brochures and briefings and will include information on:</p> <ol style="list-style-type: none">1. The role of biological monitors and authority of monitors to stop work;2. Locally known invasive weeds and limiting weed spread and colonization;3. The MBTA and nest-avoidance measures;4. Special status species present or potentially present within the corridors;5. Desert tortoise history in the project area, desert tortoise ecology, threats to the species, and the protection measures described here and in the BO (USFWS 2014);6. Mohave ground squirrel history in the project area, ecology and the avoidance and minimization measures described in this section for this species;7. Other sensitive species that may be found throughout the construction of the project, and the avoidance and minimization measures described in this section for these species; and8. Locations and designations of critical habitat and DWMA in the project area. <p>All personnel will sign a statement that they have received, understand and will follow the regulations and protection measures presented in the program. Copies of signed statements will be on file at the Environmental Management Office. This measure fulfills or exceeds the requirements in the BO (USFWS, 2014).</p> <p>MM NAT-2: Wash all vehicles and equipment prior to bringing them on site if they have been used in areas off-base.</p> <p>MM NAT-3: All project-related construction activities will be conducted during daylight hours. If any activities are to disturb native habitat between dusk and dawn, they shall be limited to areas which have already been cleared of desert tortoises and other sensitive species by biological monitors and enclosed by a fence to exclude desert tortoises (USFWS, 2014).</p> <p>MM NAT-4: Ensure that qualified biological monitors are present during all construction-related activities to confirm avoidance and minimization of all biological resources is being conducted to the maximum extent practicable. These measures include:</p> <ol style="list-style-type: none">1. Biological monitors will be available during site development activities which may result in injury or mortality of desert tortoises. The designated biologist will determine which activities require biological monitoring.2. Any desert tortoises found during construction-related activities will be relocated to nearby safe areas, not more than 100 meters from the point of capture. When the area is considered safe, desert tortoises will be returned to their point of capture.3. When handling desert tortoises, the qualified biologists and environmental monitors will follow the procedures described in <i>Guidelines for Handling Desert Tortoises During Construction Projects</i> (Desert Tortoise Special status species present or potentially present within the corridors;4. Only qualified biologists, as defined by the USFWS and the designated biologist will conduct preconstruction surveys for desert tortoises and remove animals from work areas to nearby suitable habitat.5. The proponent shall employ the services of a qualified biologist if the proponent plans to install, repair, maintain or remove a utility during nesting season (1 February – 30 August). <p>MM NAT-5: Limit disturbance areas during construction to the minimum needed to perform activities. During construction, activity areas will be clearly fenced, marked</p>

Resource	Measures to Minimize or Reduce Impacts
	<p>and flagged at the outer boundaries to define the limits of work areas. Installation of fencing along roadways will be implemented in areas deemed hazardous to desert tortoise to prevent injury or mortality. All workers will be instructed to confine their activities to the marked areas (USFWS, 2014).</p> <p>MM NAT-6: Laydown, parking, and staging areas will be restricted to previously disturbed areas to the maximum extent practicable (USFWS, 2014).</p> <p>MM NAT-7: Vehicles will, to the maximum extent practicable, remain on established roads. Equipment and vehicle operators will be alert for desert tortoises and other wildlife in and along access routes. When traveling off-road, speed limits will not exceed 5 miles per hour and shrubs will be avoided as much as possible. Speed limits on dirt roads within the project area shall be less than 20 mph unless otherwise posted.</p> <p>MM NAT-8: All personnel on the site will check under parked vehicles and equipment for desert tortoises and other wildlife species before moving vehicles. If a desert tortoise is discovered under a parked vehicle, an authorized biologist shall relocate the animal to a nearby, safe location. The authorized biologist shall use his or her best professional judgment to ensure that desert tortoises moved in this manner are not subjected to temperature extremes which could result in injury or death. Alternatively, the vehicle shall be left in place until the desert tortoise moves of its own volition (USFWS, 2014).</p> <p>MM NAT-9: All trash will be placed in closed and covered containers for proper disposal to reduce its attractiveness to desert tortoise predators (e.g., coyotes and common ravens). The containers must not be able to be opened by predators and must be emptied regularly to ensure adequate capacity is maintained. Water tanks and trucks will be maintained in good working order and free of leaks so common ravens and other predators will not be attracted to standing water (USFWS, 2014).</p> <p>MM NAT-10: If common raven presence increases locally as a result of the proposed project, perch deterrents will be placed on structures that are supporting perching (USFWS, 2014).</p> <p>MM NAT-11: Pre-construction surveys will be conducted by the biological monitor immediately in front of all equipment. During these surveys, the biological monitor will identify the following resources and complete the following activities:</p> <ol style="list-style-type: none"> 1. Identify active nests that fall under the MBTA, and flag an avoidance area for each nest at a minimum of 50 meters from the nest. 2. Identify rare plant species occurrence. Avoid rare plant species locations whenever possible. 3. Identify potential desert tortoise burrows and flag for avoidance, if possible, at a minimum distance of 10 meters to avoid any activities affecting the burrow or any individuals underground. If avoidance of desert tortoise burrows is not possible, individual burrows will be scoped to determine if there is an animal underground. If no tortoise is using the burrow, the burrow will be excavated according to the <i>Guidelines for Handling Desert Tortoises During Construction Projects</i> (Desert Tortoise Council, 1996). 4. Avoid the desert tortoise. However, if avoidance is not possible, individuals found above-ground within the project area will be temporarily moved out of harm's way by an authorized biologist according to the <i>Guidelines for Handling Desert Tortoises During Construction Projects</i> (Desert Tortoise Council 1996). Desert tortoises shall not be released more than 100 meters from the point of capture (USFWS, 2014). <p>MM NAT-12: All project personnel shall immediately report sightings of desert tortoises and other sensitive species and their burrows found within the project area to the biological monitor.</p> <p>MM NAT-13: Above ground utilities lines will be placed at least 18 inches aboveground when they traverse desert tortoise habitat. If at any time after installation, the height of the gas pipes above the ground has been reduced to less than 18 inches, the pipelines will either be raised or the materials causing the reduction will be removed (USFWS, 2014).</p> <p>MM NAT-14: Underground utilities will be located adjacent to or within previously disturbed areas when possible (USFWS 2014).</p>

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Resource	Measures to Minimize or Reduce Impacts
	<p>MM NAT-15: Lands above utilities will be re-vegetated unless a road needs to be constructed and maintained for access and maintenance activities. Roads needed for utility maintenance will be concentrated in previously established corridors when possible (USFWS, 2014).</p> <p>MM NAT-16: Habitat restoration in the form of re-vegetation will be implemented as required.</p> <ol style="list-style-type: none"> 1. Habitat restoration for ground disturbance will include techniques to control soil erosion that have been proven successful in the desert environment, and will include the use of native plants and seeds to mimic natural biodiversity 2. Habitat restoration activities will be conducted in accordance with the Edwards Air Force Base Revegetation Guide prepared by Edwards AFB (U.S. Air Force, 1994; U.S. Air Force, 2012c) 3. Monitoring success of efforts will be implemented for a longer period than the standard 5-year monitoring period due to slow recovery rates of re-vegetation areas in the desert. <p>MM NAT-17: Open excavations will be checked three times a day and authorized personnel will remove any trapped animals. Open excavations will be covered, backfilled, or fenced at the end of each work day unless other methods of excluding desert tortoises are employed. At the ends of a ditch or trench, a 3:1 slope will be created to allow wildlife to exit should they become trapped (USFWS, 2014).</p> <p>MM NAT-18: Any pipes left or stored on the ground in the project area will be capped on both ends to prevent entry by desert tortoises or other wildlife (USFWS, 2014).</p>
Noise	<p>MM NOZ-1: Noise levels could be reduced by limiting construction noise to daytime (e.g., 7:00 a.m. to 7:00 p.m.) and shortening work periods. In addition, noise levels would be minimized by keeping the construction activities at a distance from residential areas. Where noise may be a concern during construction, monitoring at the receptor location may be considered to minimize impact to sensitive receptors and communities. Noise levels would return to background levels once construction activities cease.</p>
Socioeconomics	<p>No significant impacts would occur and no mitigation is warranted.</p>
Water Resources	<p>MMHYD 1: If construction within a floodplain is required, appropriate mitigations for reducing flooding hazards as identified by a qualified, state of California registered geologist or engineer would be identified and incorporated into the final design of the selected alternative. This may include prohibiting construction during the rainy season and including design features in the project to minimize flooding impacts to the project.</p> <p>MMHYD-2: The selected alternative may require a SWPPP in support of a NPDES permit in connection with construction activities. Implementation of a SWPPP would ensure protection of downstream water quality, as sediment erosion would be controlled and sediment movement from the proposed alternative during construction would be reduced.</p>

3.0 AFFECTED ENVIRONMENT

This chapter describes existing environmental conditions likely to be affected by the Proposed Alternatives, including the No Action Alternative. It provides the baseline information that was used to identify and evaluate potential environmental changes resulting from the implementation of the Proposed Alternatives. Resources identified that may be affected by the project include air quality and greenhouse gases, cultural and paleontological resources, geology and soils, hazardous materials and hazardous waste, infrastructure, land use, natural resources, noise, socioeconomics and water resources.

3.1 AIR QUALITY AND GREENHOUSE GASES

The Main Base at Edwards AFB is located in the eastern portion of Kern County, but portions of the Base extend to Los Angeles County in the south and San Bernardino County in the east. Eastern Kern County is located on the western edge of the Mojave Desert and is separated from populated valleys and coastal areas to the west and south by several mountain ranges. These valleys and coastal areas contain the major source of ozone precursor emissions affecting ozone exceedances within Kern County's part of the Mojave Desert Air Basin (MDAB). The Eastern Kern County region is largely impacted by ozone transport from both the San Joaquin Valley Air Basin and the South Coast Air Basin. Elevated levels of particulate matter are primarily associated with fugitive dust, which is produced through a combination of high winds, dry soil conditions resulting from an arid climate and ground-disturbing activities such as mining, agriculture and construction.

The Proposed Action would take place mostly within Kern County, but Utility Corridors 1 and 3 of Alternatives 1 and 3, respectively, would be partially within Los Angeles County; Utility Corridor 5 would be partially within San Bernardino County; and Utility Corridor 4 would be entirely within San Bernardino County. The Kern County portion of the Proposed Action is under the jurisdiction of the Eastern Kern Air Pollution Control District (EKAPCD). The Los Angeles County portion of the Proposed Action is under the jurisdiction of the Antelope Valley Air Quality Management District (AVAQMD). The San Bernardino County portion of the

Proposed Action is under the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). These three districts constitute most of the MDAB.

3.1.1 Air Quality

Air quality in a given location is defined by the concentration of various pollutants in the atmosphere. By comparing a pollutant concentration in the atmosphere to federal and/or state ambient air quality standards, the significance of its presence can be determined.

Pursuant to the Federal Clean Air Act Amendments of 1990 (CAA), the United States Environmental Protection Agency (USEPA) has established National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The NAAQS are classified as primary and secondary standards. Primary standards prescribe the maximum permissible concentration in the ambient air and are required to protect public health. Secondary standards specify the levels of air quality required to protect public welfare, including materials, soils, vegetation and wildlife, from any known or anticipated adverse effects. NAAQS are established for six pollutants (known as criteria pollutants): ozone (O₃), particle pollution (i.e., respirable particulate matter less than 10 microns in diameter [PM₁₀] and respirable particulate matter less than 2.5 microns in diameter [PM_{2.5}]), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and lead (Pb). Under the federal CAA, attainment and maintenance of NAAQS are required.

The California Air Resource Board (CARB) has also adopted its own air quality standards in the state of California, known as the California Ambient Air Quality Standards (CAAQS) under the California CAA. The CAAQS are generally more stringent than the NAAQS and include air quality standards for all the criteria pollutants listed under NAAQS plus sulfates (SO₄), hydrogen sulfide (H₂S), vinyl chloride and visibility-reducing particulate matter. The California CAA established California's air quality goals, planning mechanisms, regulatory strategies and standards of progress aimed at meeting and/or exceeding CAA requirements for air quality. The California CAA requires attainment of CAAQS for criteria pollutants by the earliest practicable date. A summary of federal and state ambient air quality standards is outlined in Table 3-1.

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Table 3-1
National and State Ambient Air Quality Standards

Pollutant		Averaging Time	California Standards ¹	National Standards ²	
			Concentration ³	Primary ^{3,4}	Secondary
Ozone (O ₃)		1 Hour	0.09 ppm (180 µg/m ³)	—	Same as Primary Standard
		8 Hour	0.070 ppm (137 µg/m ³)	0.075 ppm (147 µg/m ³)	
Particulate Matter (PM ₁₀) ⁶		24 Hour	50 µg/m ³	150 µg/m ³	Same as Primary Standard
		Annual Arithmetic Mean	20 µg/m ³	—	
Fine Particulate Matter (PM _{2.5}) ⁶		24 Hour	—	35 µg/m ³	Same as
		Annual Arithmetic Mean	12 µg/m ³	12.0 µg/m ³	15 µg/m ³
Carbon Monoxide (CO)		1 Hour	20 ppm (23 mg/m3)	35 ppm (40 mg/m ³)	—
		8 Hour	9.0 ppm (10 mg/m ³)	9 ppm (10 mg/m ³)	—
Nitrogen Dioxide (NO ₂) ⁷		1 Hour	0.18 ppm (339 µg/m ³)	100 ppb (188 µg/m ³)	—
		Annual Arithmetic Mean	0.030 ppm (57 µg/m ³)	0.053 ppm (100 µg/m ³)	Same as Primary Standard
Sulfur Dioxide (SO ₂) ⁸		1 Hour	0.25 ppm (655 µg/m ³)	75 ppb (196 µg/m ³)	—
		3 Hour	—	—	0.5 ppm
		24 Hour	0.04 ppm (105 µg/m ³)	0.14 ppm (for certain areas) ⁸	—
		Annual Arithmetic Mean	—	0.030 ppm (for certain areas) ⁸	—
Lead ^{9,10}		30 Day Average	1.5 µg/m ³	—	—
		Calendar Quarter	—	1.5 µg/m ³ (for certain areas) ⁹	Same as Primary Standard
		Rolling 3-Month Average	—	0.15 µg/m ³	
Visibility Reducing Particles ¹¹		8 Hour	See footnote 11	No National Standards	
Sulfates		24 Hour	25 µg/m ³		
Hydrogen Sulfide		1 Hour	0.03 ppm (42 µg/m ³)		
Vinyl Chloride ⁹		24 Hour	0.01 ppm (26 µg/m ³)		

Sources:

- Table extracted from <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf> on June 2014 (California Air Resource Board, 2013).

Notes:

1. California standards for ozone, carbon monoxide, sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM₁₀, PM_{2.5}, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded.

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2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10} , the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 degrees Celsius ($^{\circ}\text{C}$) and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to parts per million (ppm) by volume, or micromoles of pollutant per mole of gas.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health (USEPA, 1996).
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant (USEPA, 1996).
6. On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from $15 \mu\text{g}/\text{m}^3$ to $12.0 \mu\text{g}/\text{m}^3$. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at $35 \mu\text{g}/\text{m}^3$, as was the annual secondary standard of $15 \mu\text{g}/\text{m}^3$. The existing 24-hour PM_{10} standards (primary and secondary) of $150 \mu\text{g}/\text{m}^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
7. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 parts per billion (ppb). Note that the national 1-hour standard is in units of ppb. California standards are in units of ppm. To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
8. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved. The USEPA has not made final designations on attainment status. Note that the 1-hour national standard is in units of ppb. California standards are in units of ppm. To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
9. The CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
10. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard ($1.5 \mu\text{g}/\text{m}^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
11. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Existing Conditions

The USEPA classifies the air quality within an Air Quality Control Region with regard to its attainment of federal primary and secondary NAAQS. Pursuant to USEPA guidelines, an area with air quality better than the NAAQS for a specific pollutant is designated as being in attainment for that pollutant. Any area not meeting the NAAQS is classified as a nonattainment area. Where there is a lack of data for the USEPA to make a determination regarding attainment or nonattainment, the area is designated as unclassified and is treated as an attainment area until proven otherwise. Similarly, California makes state area designations for the state criteria pollutants.

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Pollutant concentrations are assessed relative to both the federal and state ambient air quality standards. To determine attainment of the NAAQS and CAAQS, air districts monitor air quality through a network of air monitoring stations within their boundaries. Data collected at the monitoring stations is compiled and used to track air quality conditions and support attainment efforts.

As of January 30, 2015, the USEPA listed Eastern Kern County as attainment for all standards except the 8-hour O₃ and PM₁₀ standards, and designated San Bernardino County as attainment for all standards except the PM₁₀ standard (USEPA, 2015). State attainment designations are listed in Table 3-2.

**Table 3-2
State Attainment**

CAAQS	Counties		
	Eastern Kern	Los Angeles Portion of AVAQMD	San Bernardino Portion of MDAQMD
O ₃	Nonattainment	Nonattainment	Nonattainment
PM _{2.5}	Unclassified	Unclassified	Nonattainment
PM ₁₀	Nonattainment	Nonattainment	Nonattainment
CO	Unclassified	Attainment	Attainment
NO ₂	Attainment	Attainment	Attainment
SO ₂	Attainment	Attainment	Attainment
Sulfates	Attainment	Attainment	Attainment
Pb	Attainment	Attainment	Attainment
H ₂ S	Unclassified	Unclassified	Unclassified
Visibility Reducing Particles	Unclassified	Unclassified	Unclassified

Source: CARB, 2014a

Notes: CO Carbon monoxide
H₂S hydrogen sulfide
Pb lead
NO₂ nitrogen dioxide
O₃ ozone
PM_{2.5} particulate matter less than 2.5 microns in diameter
PM₁₀ particulate matter less than 10 microns in diameter
SO₂ sulfur dioxide

General Conformity Requirements

Section 176(c) of the federal CAA contains requirements that apply specifically to federal agency actions, including actions receiving federal funding. This section of the CAA requires federal agencies to ensure that their actions are consistent with the CAA and with applicable

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state air quality management plans. The general conformity regulation is codified in 40 CFR, Part 51, Subpart W, and Part 93, Subpart B.

Federal agencies are required to evaluate their proposed actions to ensure that they will not cause or contribute to new violations of any federal ambient air quality standards, that they will not increase the frequency or severity of any existing violations of federal ambient air quality standards and that they will not delay the timely attainment of federal ambient air quality standards. To this end, the USEPA general conformity rule requires a formal conformity determination document for federally sponsored or funded actions in nonattainment or maintenance areas when the net increase in direct and indirect emissions of nonattainment or maintenance pollutants exceeds specified *de minimis* thresholds.

A federal action is exempt from general conformity requirements if the total emissions resulting from the action are equal to or less than the *de minimis* thresholds. Thus, the action's calculated emissions are compared to established *de minimis* emission levels based on the nonattainment status for each applicable criteria pollutant in the area of concern to determine the relevant compliance requirements. Table 3-3 defines the *de minimis* thresholds that apply to Kern, Los Angeles, and San Bernardino counties. If the calculated emissions are equal to or greater than *de minimis* levels, then the requirements of air conformity apply to the action.

Table 3-3
De Minimis Thresholds in Nonattainment Areas

Pollutant	Degree of Non-attainment	<i>De Minimis</i> Level (tons/year)	Kern County	Los Angeles County	San Bernardino County
Ozone	Serious	50			
	Severe	25		X	
	Extreme	10			
	Marginal and Moderate (outside an ozone transport region)	100	X		
	Marginal and Moderate (inside an ozone transport region)	50 (VOC)			
		100 (NO _x)			
Carbon monoxide	All	100			
Particulate matter	Moderate	100			X
	Serious	70			
SO ₂ or NO ₂	All	100			

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Pollutant	Degree of Non-attainment	<i>De Minimis</i> Level (tons/year)	Kern County	Los Angeles County	San Bernardino County
Lead	All	25			

Notes: NO nitrogen monoxide
NO₂ nitrogen dioxide
NO_x nitrogen oxides (NO and NO₂)
SO₂ sulfur dioxide
VOC volatile organic compound

3.1.2 Greenhouse Gases

Background

Changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of greenhouse gas (GHG) emissions in the atmosphere. Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Greenhouse gases trap solar heat in the atmosphere, which in turn heats the surface of the earth. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities (e.g., combustion of fossil fuel). Common GHGs include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). GHGs are commonly quantified in the equivalent mass of CO₂, denoted CO₂e, which takes into account the global warming potential (GWP) of each individual GHG compound. The most common GHG that results from human activity is carbon dioxide, followed by methane and nitrous oxide.

Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas and oil), solid waste, trees and wood products, and also as a result of certain chemical reactions (e.g., manufacture of cement). Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

Methane is emitted during the production and transport of coal, natural gas and oil. Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.

Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

Hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for stratospheric ozone-depleting substances (e.g., chlorofluorocarbons, hydrochlorofluorocarbons and halons).

The following sections describe some approaches taken by federal agencies to address climate change:

Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, issued in October of 2009, states that the policy of the U.S. is that federal agencies increase energy efficiency, measure, report and reduce their GHG emissions from direct and indirect activities.

Executive Order 13653, *Preparing the United States for the Impacts of Climate Change*, was signed in November 2013 to provide direction for federal agencies to take a series of steps to facilitate efforts for American communities to strengthen their resilience to climate change.

The USEPA is the agency responsible for writing and implementing federal regulation for the protection of the environment, including implementation of measures to address climate change. To this end, the USEPA pursues a number of efforts, including regulatory initiatives such as the GHG Reporting Program, standards for new motor vehicles, Renewable Fuel Standard Program, and landfill air pollution standards (USEPA, 2014).

The GHG Reporting Program (i.e., 40 CFR, Part 98) requires mandatory reporting of GHG emissions for certain industrial operations, most of which are large emitters of GHGs (e.g., electricity generation facilities, oil refineries, and manufacturing operations). Mandatory reporting is also required for facilities capable of emitting more than 25,000 metric tons of CO₂-equivalents (MTCO₂e) per year from all combined stationary fuel combustion sources (e.g., boilers and stationary engines).

The USEPA in coordination with the National Highway Traffic Safety Administration pursues efforts to enable the production of a new generation of clean vehicles through reduced greenhouse gas emissions and improved fuel use. Enacted and proposed standards are expected to reduce more than 3,100 million metric tons of carbon dioxide emissions by 2025.

Efforts to develop and implement regulations to ensure that transportation fuel sold in the United States contains a minimum volume of renewable fuel (i.e., the Renewable Fuel Standard program) are expected to reduce GHG emissions by 138 million metric tons by 2022.

On July 1, 2014, the USEPA proposed updates to its air standards to new municipal solid waste (MSW) landfills, requiring certain landfills to capture additional landfill gas in an effort to reduce emissions of CH₄.

Existing Conditions

Based on the 2014 update of the California GHG inventory for 2000 to 2012 prepared by the CARB, California emitted 458.68MMT CO₂e in 2012 (CARB, 2014b). According to CARB, the potential impacts in California due to global climate change may include loss in snow pack; sea level rise; more extreme heat days per year; more high ozone days; more large forest fires; more drought years; increased erosion of California's coastlines; sea water intrusion into the Sacramento and San Joaquin Deltas and associated levee systems; and increased pest infestation. As previously mentioned, various measures are currently in effect to reduce GHG emissions in an effort to mitigate climate change effects resulting from anthropogenic activity.

3.2 CULTURAL AND PALEONTOLOGICAL RESOURCES

The following section provides the contextual background information for known cultural and paleontological resources within the proposed utility corridors (Corridors 1 through 6 and 9, which correspond to Alternatives 1 through 7), including paleontological, prehistoric, ethnographic and historical settings. This section also summarizes the results of previous cultural resource surveys of the project area.

3.2.1 Overview

The information provided here is based primarily on previous cultural resources studies (Boyer, 2005; Bupp et al., 1998; Crosby, 2010; Earle et al., 1997; Earle et al., 1998; ECORP Consulting, Inc., 2013; Edwards AFB, 2012a; Giambastiani et al., 2007; Giambastiani et al., 2013; Green et al., 2002; Hale and Hanten 2014; Hector et al., 1988; Holmes et al., 2004; Jones and Stokes, 1998; King and Spinney, 2010; King et al., 2010; Macko, 1993; McGetrick et al., 2002; Parker, 2001; Puckett et al., 2003; Puckett and Peyton, 2008; Puckett and Spinney, 2004, 2005; Ronning et al., 1997; Spinney and Mates, 2010; Spinney, 2004; Sutton and Robinson, 1977; and Wade and Hector, 1989). Over the last 37 years, these prior cultural resources studies were conducted in compliance with the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA, of 1966, as amended; see 16 USC 470f) and the California Environmental Quality Act (CEQA) to identify archaeological, historical built architectural resources and other cultural resources on Edwards AFB and provide a baseline for the types of archaeological sites that may be identified within the project area. [Due to the confidential nature of certain types of cultural resources information, the locations of cultural resources have been removed from these reports].

In accordance with Section 106 of the NHPA and NEPA, the US Air Force (USAF) will perform consultation with the federally-recognized Native American Tribes affiliated with Edwards AFB. There is also the potential for paleontological resources to be affected by the proposed project and therefore, it is discussed within this section.

3.2.2 Cultural and Paleontological Setting

This section presents a brief overview of the environmental setting and cultural history for the proposed project location. Understanding the environmental setting of a project area aids in identifying the types of resources that may be encountered during the proposed project, or that would be associated with a certain type of land use. Additional information pertaining to the environmental setting of the Antelope Valley and Mojave Desert may be found in the Edwards

AFB Integrated Cultural Resources Management Plan (ICRMP) (Edwards AFB, 2012a) and the Edwards AFB cultural overviews (Earle et al., 1997; Earle et al., 1998; Ronning et al., 1997).

The proposed project area is situated within the Antelope Valley which is in the Western Mojave Desert. The Mojave Desert is characterized by a region of isolated mountain ranges, separated by desert plains; it is wedged between the Garlock Fault and the San Andreas Fault, which have uplifted the surrounding mountains relatively rapidly. This uplift resulted in an isolation of the Mojave Desert from the Pacific Coast, creating the interior drainage basins of the Western Mojave Desert, such as the Antelope Valley. On the west end, the Antelope Valley is defined by the Tehachapi and San Gabriel mountains, which form a “v”-shaped basin along the western boundary of the Mojave Desert.

The Antelope Valley floor is comprised of thick deposits of Quaternary alluvial and lacustral (lakebed) sediments. The alluvial sediments are subdivided into two units: the older or Pleistocene Quaternary sediments, and the younger or Holocene alluvial surface deposits, both of which derive from nearby granitic mountains and have been deposited on the valley floor over thousands of years. These sediments include loosely consolidated mixtures of gravel, sand, and clay and extend to depths of 10 feet or greater beneath the surface.

Paleoenvironment and Paleontological Setting

Between 12,000 and 10,000 years ago, the western United States faced environmental change on a mass scale; the glaciers began to recede; the climate dramatically became warmer and drier; and vegetation and animals began inhabiting higher elevations (Earle et al., 1997; ECORP Consulting Inc., 2013; Sutton and Robinson, 1997).

Based on paleontological evidence, by the late Pleistocene age, the Antelope Valley was inhabited by numerous large mammalian species (e.g., sloths, horses, bears, mammoth, bison, camels, as well as prong-horned antelope), large carnivorous species (e.g., saber-toothed cats, wolves, mountain lions, desert coyotes and foxes), smaller animals (e.g., rodent, rabbits, squirrels) and a multitude of birds. The evidence also reveals that desert vegetation began replacing the low-elevation woodlands as early as 12,000 and 8,000 years ago and the types of

plants and animal communities present in the Antelope Valley today were not established until 4,300 years ago (Earle et al., 1997; ECORP Consulting Inc., 2013; Giambastiani et al., 2007; Giambastiani et al., 2013; Sutton and Robinson, 1997). Around that time, modern researchers have identified evidence of a large, fresh-water lake, Lake Thompson, which covered much of the Antelope Valley. Approximately 8,000 years ago, Lake Thompson receded, splitting into Rosamond, Buckhorn and Rogers lakes (Earle et al., 1997; ECORP Consulting Inc., 2013; Giambastiani et al., 2007; Giambastiani et al., 2013; Sutton and Robinson, 1997).

Paleontological resources are the mineralized (fossilized) remains of prehistoric plants and animals and the mineralized impressions (trace fossils) left as indirect evidence of the form and activity of such organisms. These resources are located within sedimentary rocks or alluvium and are considered nonrenewable.

Formations that contain vertebrate fossils are considered more sensitive because vertebrate fossils tend to be rare and fragmentary. Formations containing microfossils, plant casts and invertebrate fossils are more common. A significant fossil deposit is a rock unit or formation that contains significant nonrenewable paleontological resources. This is defined as comprising one or more identifiable vertebrate fossils, large or small and any associated invertebrate and plant fossils, traces and other data that provide taphonomic, taxonomic, phylogenetic, ecologic and stratigraphic information (ichnites and trace fossils generated by vertebrate animals such as trackways or nests or middens), which provide datable material and climatic information. This definition excludes invertebrate or botanical fossils except when present within a given vertebrate assemblage. However, invertebrate and botanical fossils may be significant as environmental indicators associated with vertebrate fossils.

Prehistoric Setting

Since the 1980s, new archaeological research, relying upon radiocarbon dating, obsidian hydration and flaked stone technology profiles, has refined the prehistoric chronology of human occupation in the Mojave Desert, which suggests cultural resources dating to the Pleistocene, early Holocene, middle Holocene and the late Holocene. Additionally, it has been theorized that

a Pre-Clovis complex, pre-dating 12,000 years before present (BP), occupied portions of the Mojave Desert, although little to no solid archaeological evidence has been documented (Bupp et al., 1998; Earle et al., 1997; ECORP Consulting Inc., 2013; Giambastiani et al., 2007; Giambastiani et al., 2013; Holmes et al., 2004; Macko, 1993; and Sutton and Robinson, 1997). The chronology has been subdivided into the following:

- The Fluted Point or Late Pleistocene Period (12,000 to 10,000 BP)
- Lake Mojave Period or Early Holocene (10,000 to 7,000 BP)
- The Pinto Period or the Early to Middle Holocene (7,000 to 4,000 BP)
- Gypsum Period (4,000 to 1450 BP)
- Saratoga Spring/Rose Spring Period or the Late Holocene (1450 to 750 BP) and
- Late Prehistoric Period or Late Holocene (950 BP to Contact, circa 180 BP)

Ethnographic Setting

Ethnographic accounts indicate that the project area was used by two groups, the Kitanemuk and the Kawaiisu, each of which is briefly described in the following paragraphs.

The Kawaiisu occupied the Piute Mountains at the southern end of the Sierra Nevada Range and the northern part of the Tehachapi Mountains, as well as portions of the valley floors. Kawaiisu economy was based on hunting and gathering, with their primary food sources including acorns, deer, bighorn sheep, rabbits and pronghorn.

The Kitanemuk occupied the territory extending from the Tehachapi Mountains into the western end of the Antelope Valley. During cooler seasons or at least seasonally, it is believed they migrated into the arid valley floors; during the Late Prehistoric Period, the settlements became permanent along the desert floor. By the Mission Period (1769 to 1834), the Kitanemuk were moved to the missions of San Fernando, San Gabriel, and San Buenaventura. By the 1850s, some Kitanemuk settled at Fort Tejon and nearby Tejon Ranch, but were moved later onto the Tule Reservation.

Historic Context

Among the earliest non-native populations to occupy the area were Spanish explorers, who arrived in the Antelope Valley in the 1770s. By 1828, both Mexican traders and American trappers led by Jedediah Smith established two routes through the area providing access from the Mojave Desert to the coast, via the Old Spanish Trail near the Cajon Pass and the Owens Valley Road through the Tehachapi Pass. The routes were used later by Kit Carson and John C. Fremont (1844) and later by survey parties searching for an alternative route for the transcontinental railroad; it would not be until 1876 that the Southern Pacific Railroad extended through the Antelope Valley and until 1884 that the Atchison, Topeka & Santa Fe traversed through Mojave. By the mid-1860s and 1870s, the Antelope Valley was used extensively as an access route between Los Angeles and mining districts to the east, including mines in the Rosamond area.

Colonization companies representing Quakers, German Lutherans, Scots, English and others began to promote settlement of the southern Antelope Valley by the 1880s. Between 1880 and the early 1920s, farms in the Antelope Valley flourished, producing wheat, barley, grains, alfalfa, fruits and nuts, along with cattle and sheep rearing, with the one mile-square townsite of Lancaster being established between 1883 and 1884, southwest of the ADP area. Rural areas outside of Lancaster, including the proposed ADP vicinity, were settled by families who purchased lands from the federal government, railroad or obtained land patents. Between 1910 and the mid-1930s, hundreds of claims were filed for land within the Edwards AFB boundaries and the Antelope Valley. By the 1930s, however, intermittent droughts, flooding, extreme winds, high temperatures and the Dust Bowl – a worldwide economic depression – resulted in the failure of utopian colonies and homesteads, with many residents leaving the area and a decrease in the number of homestead claims being filed (Edwards AFB, 2012b; Earle et al., 1998; Puckett and Spinney 2004, 2005; Puckett et al., 2003; Puckett and Peyton, 2008; Spinney 2004).

With the onset of World War II, the Antelope Valley saw economic growth due to the arrival of the military. The War Department authorized construction of the Army Air Base at Muroc Lake

(the precursor to present-day Edwards AFB), which would play a strategic role in World War II, serving as the primary installation providing long-range air patrols from the Pacific Coast and training air crews for combat. The population of Lancaster jumped from 3,600 to 29,000 between 1950 and 1960. The 1980s and 1990s saw increased development with the National Aeronautical Space Administration (NASA), as the first space shuttle orbiter was assembled at an aerospace plant in Palmdale and transported to Edwards AFB. Today the installation serves as a flight test center for testing new aircraft and weaponry, along with an area which provides a suitable environment for testing propulsion systems and vehicles for space exploration.

3.2.3 Cultural Resources within the Proposed Utility Corridor Areas

Based on past land use activities in the Regional Area and prior cultural resources studies (Hale and Hanten 2014), the types of cultural resources that may be present in the proposed utility corridors include the following:

- Prehistoric Archaeological Sites: to include archaeological sites encompassing base camps or villages, lithic deposits, roasting pits or hearths and temporary camp sites;
- Historic-Period Archaeological Sites: to include archaeological sites such as agricultural features, homesites, refuse deposits, mining features, railroads or labor camps;
- Sub-Modern Archaeological Sites: to include archaeological sites that date between 45 and 50 years of age;
- Multi-component Archaeological Sites: to include archaeological sites containing both prehistoric and historic-period or sub-modern artifacts or features;
- Built-Environment/Structures: to include standing structures, buildings, or objects that are not in ruinous condition (otherwise considered archaeological remains); and
- Isolated Finds: to include one or two individual artifacts with no other associated cultural material. Isolated finds may include prehistoric, historic period or sub-modern artifacts.

The majority of these corridors have been surveyed for cultural resources previously, with the result that archaeological resources have been identified within the proposed project locations. The following summarizes the total numbers of resources identified for each corridor.

- Corridor 1: There are 65 known archaeological sites (15 prehistoric and 50 historic period). Of these, 11 archaeological sites are considered significant (EAFB-79, EAFB-90, EAFB-100, EAFB-105, EAFB-108, EAFB-199, EAFB-206, EAFB-423, EAFB-854, EAFB-1000 and EAFB-3051) (Hale and Hanten, 2014).
- Corridor 2: There are 22 archaeological sites (4 prehistoric and 18 historic period). Of these, two are considered significant (EAFB-36 and EAFB-100) (Hale and Hanten, 2014).
- Corridor 3: A total of 83 archaeological sites (33 prehistoric, 49 historic period and 1 submodern) have been identified along this route. Of these, 13 are considered significant (EAFB-7, EAFB-8, EAFB-31, EAFB-34, EAFB-238, EAFB-835, EAFB-951, EAFB-1178, EAFB-1717, EAFB-3010, EAFB-3302, EAFB-4188 and EAFB-6083) (Hale and Hanten, 2014).
- Corridor 4: A total of 11 archaeological sites (7 prehistoric and 4 historic period) have been recorded within this corridor. One is considered significant (EAFB-588) (Hale and Hanten, 2014).
- Corridor 5: A total of 106 archaeological sites (46 prehistoric and 60 historic period) have been identified. Of these, three are considered significant (EAFB-216, EAFB-579 and EAFB-596) (Hale and Hanten, 2014).
- Corridor 6: Cultural surveys identified a total of 5 archaeological sites (2 prehistoric and 3 historic period). Of these, one is considered significant (EAFB-6123) (Hale and Hanten, 2014).
- Corridor 9: A total of 53 archaeological sites (34 prehistoric, 15 historic period and 4 submodern) have been recorded along Corridor 9. Of these, two are considered significant (EAFB-562 and EAFB-845) (Hale and Hanten, 2014).
- Under Alternative 8, there would be no utility corridors established.

3.3 GEOLOGY AND SOILS

The following section provides background information for the topography, geology and potential seismic hazards and soils of Edwards AFB and specifically, the proposed utility corridor alternatives.

3.3.1 Overview

This section provides an overview of the project area's topography, geology, seismicity and soils.

Topography

Edwards AFB (Base) is located approximately five miles northeast of the City of Lancaster in the Antelope Valley of southern California. Edwards AFB covers portions of three different counties, Kern, Los Angeles and San Bernardino Counties, and encompasses approximately 470 square miles of the western Mojave Desert. The Base is located in a region of arid climate characterized by hot summers with maximum temperatures ranging from 110°F to 115°F. Winter temperatures vary from mild to cold with night temperatures sometimes falling below freezing. Precipitation is primarily in the form of rain that seldom exceeds 5 inches annually and falls predominately in the winter and spring months. Typical basin and range topography observed in southwestern deserts is found at Edwards AFB (Edwards Air Force Base, 2012a). These features include mountain ranges and hill systems, alluvial fans, valley floors and basins. Rocky, gravelly and sandy washes are found throughout the Base. Antelope Valley is a closed topographic basin characterized by an interior drainage where infrequent storm water flow to Rogers Dry Lake, Buckhorn Dry Lake and Rosemond Dry Lake. Elevations at Edwards AFB range from 2,267 feet above mean sea level (AMSL) at Rogers Dry Lake to 3,424 feet (AMSL) at Red Buttes located on the installation's eastern boundary.

Geology

Edwards AFB lies in the western portion of the Mojave Desert physiographic province which includes tertiary volcanic rocks and Quaternary alluvial sediments that overlie a basement complex consisting primarily of granitic intrusive rocks (Figure 3-1). Most of Edwards AFB is underlain by basement rock consisting primarily of quartz monzonite, an intrusive igneous rock similar to granite. Small, isolated exposures of carbonate rocks and volcanic tuff and basalt occur in the Bissel Hills found in the northwestern portion of the Base. Quaternary sediment deposits include older alluvium that is presumably of Pleistocene age, younger Holocene age, lacustrine sediments, and Holocene silt and sand deposits by wind and wave. Older alluvium consists of conglomerate,

gravel, sand, silt and clay in thicknesses up to 1,000 feet. It covers much of Edwards AFB, forming portions of alluvial fans that extend from the rock outcrops on the hills down to the basins. Lacustrine sediments are sand, silt and clay that occupy both the present-day lakebeds, such as Rogers Dry Lake. Eolian sediments cover sizeable areas extending mainly from south and southwest of Rosemond Dry Lake east, past Rogers Dry Lake up the broad west slopes of the hills east of Rogers Dry Lake as well as scattered in smaller areas.

Seismicity

Southern California where Edwards AFB is located is seismically active. The San Andreas Fault Zone is located approximately 12 miles southwest of the southwestern corner of Edwards AFB, and the Garlock Fault Zone is approximately 12 miles to the northwest of the northwestern corner. The Garlock Fault Zone trends southwest-northwest and meets the San Andreas Fault 45 miles west of the Base. During the last 20 years, major earthquakes recorded near Edwards AFB at greater than 5.0 on the Richter Magnitude Scale (United States Geological Survey 2009) include the Landers and Big Bear earthquakes in June 1992 and the Mojave earthquake in July 1992.

Major faults mapped at Edwards AFB are depicted on Figure 3-1. These faults are generally parallel, northwest-southeast trending normal faults that produce horst and graben features. Alluvial deposits generally conceal the surface traces of these faults. Although there are no large active fault zones on the Base, the relative motion of the San Andreas and Garlock fault zones are responsible for the formation of a series of minor faults in the Mojave Desert including the six fault zones on the Base (Figure 3-1).

There are no Alquist-Priolo Special Studies Zones within five miles of Edwards AFB. A delineation of seismic hazards was completed in 2005 for the Rosemond USGS 7.5-minute quadrangle which includes eastern-most portion of Edwards AFB (Department of Conservation, California Geologic Survey, 2005). This area is associated with the southern end of Rosamond Dry Lake and trending south with Division Street toward Lancaster. The seismic hazards report concluded that there are areas in the Rosamond 7.5-minute quadrangle that includes a minor portion of Edwards AFB where historical occurrence of liquefaction or

local geological, geotechnical and groundwater conditions that indicate a potential for permanent groundwater displacements can occur.

Soils

A basewide survey of soils at Edwards AFB has been completed by the Natural Resources Conservation Service (NRCS) (Figure 3-2) (Edwards Air Force Base, 2012b). Most of the soils at Edwards AFB are sandy loams and loamy sands. Some of the soils have a silt or clay component especially those associated with the dry lake beds. Many of the soils have been classified to a series level where only one taxonomic unit describes the soil. Much of the soils at Edwards AFB have been classified as complexes where two or more taxonomic units have been used to describe the soil (Figure 3-2). A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Potential erosion from wind and water to soils at Edwards AFB has been determined by the NRCS as part of the soil survey. For the soils at Edwards AFB, a Wind Erodibility Group (WEG) has been determined for those soils with similar properties that affect their susceptibility to wind erosion (NRCS, 2012).

The soils assigned to Group 1 are the most susceptible to wind erosion and those assigned to Group 8 are the least susceptible. Table 3-4 details WEG values and wind erodibility index for tons of soil loss per hectare (Hazelton and Murphy 2007). Refer to Section 4.3 for further discussion of soil erosion within each corridor.

Environmental Assessment for Proposed Utility Corridors
Edwards Air Force Base, California

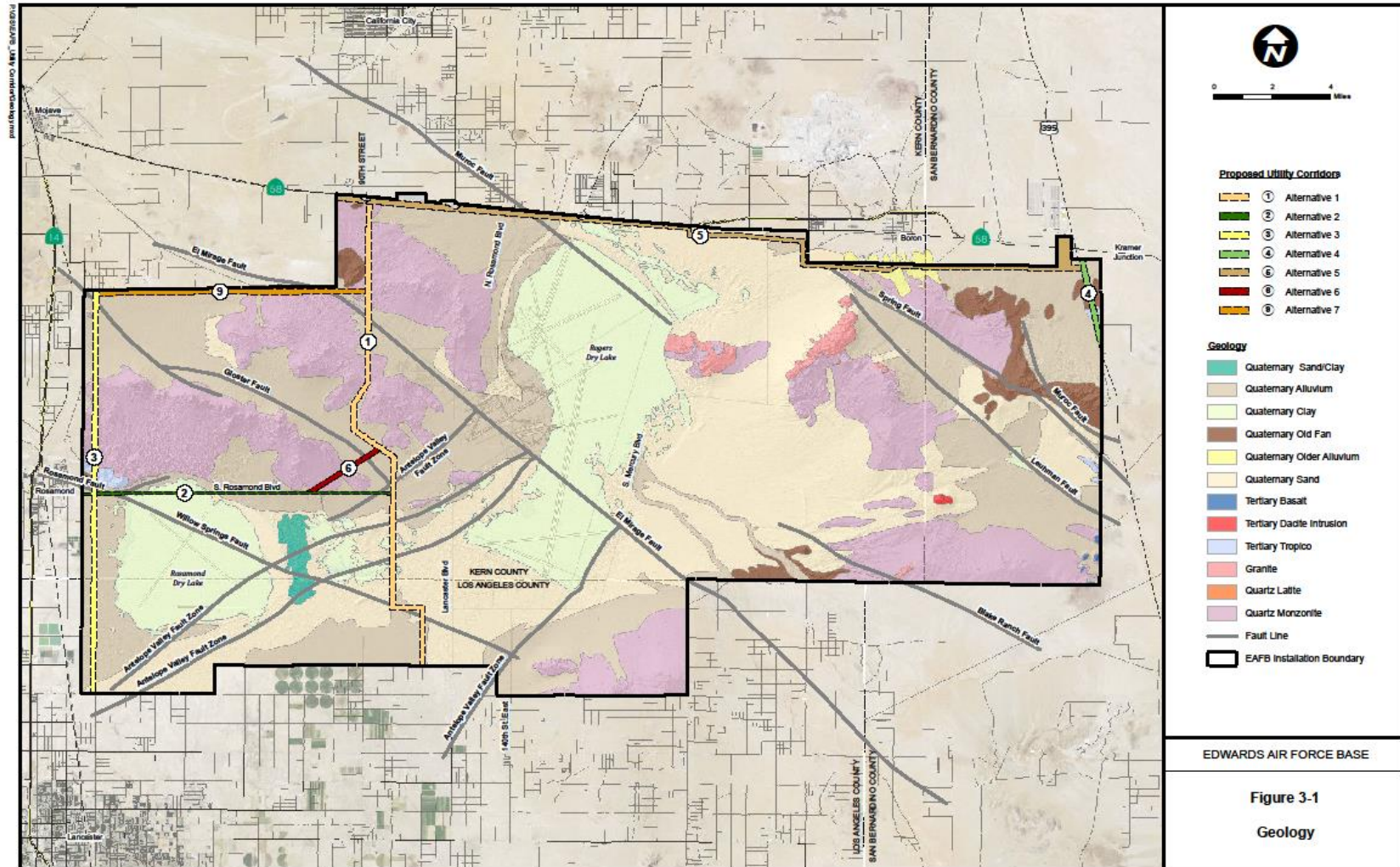


Figure 3-1 Geology

Environmental Assessment for Proposed Utility Corridors
Edwards Air Force Base, California

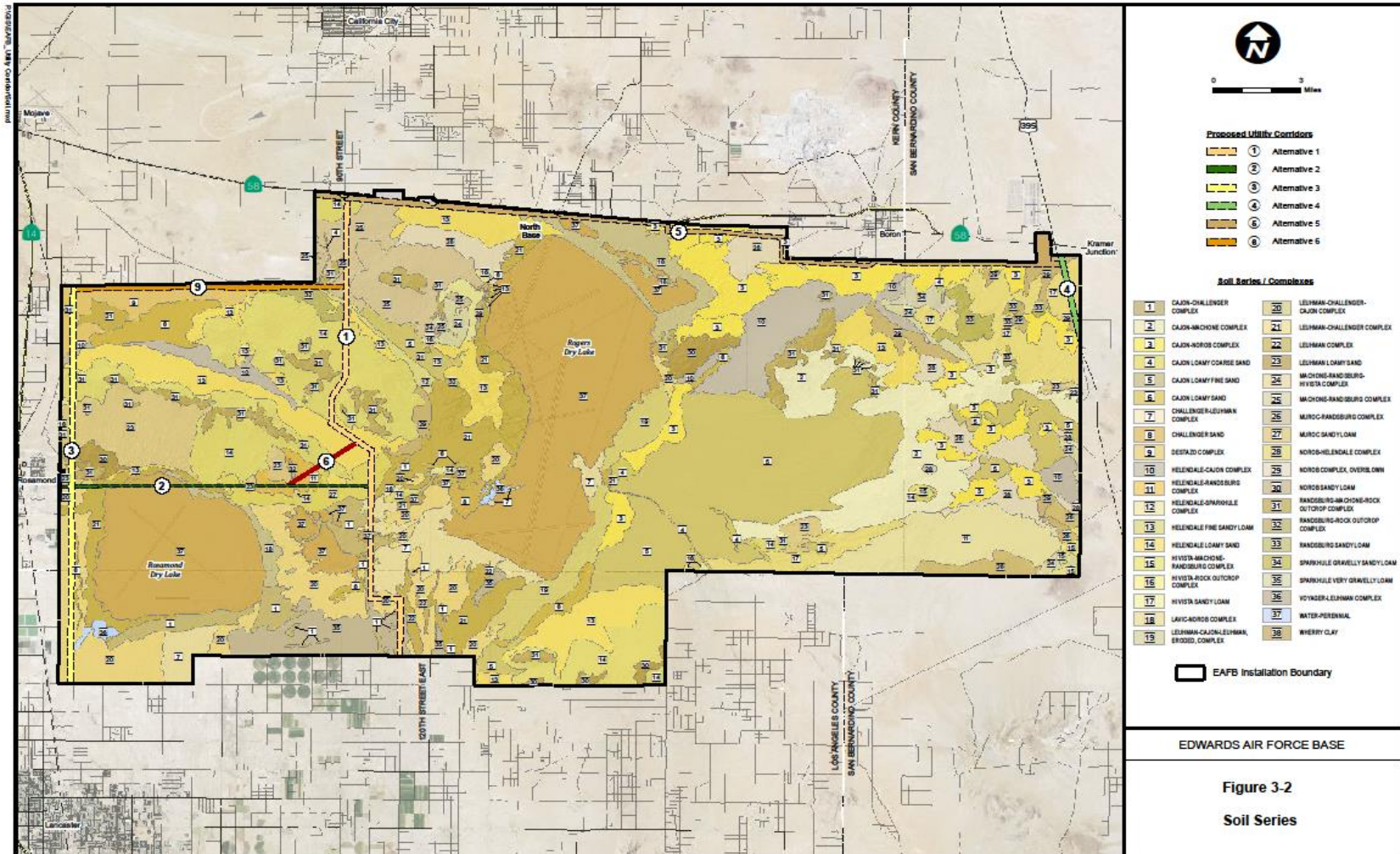


Figure 3-2 Soil Series

Table 3-4
Wind Erodibility Groups and Index for Estimated Soil Loss

Wind Erodibility Group	Wind Erodibility Index (Tons/Hectare)
1	695
2	300
3	193
4	193
5	126
6	108
7	85
8	0

The 2012 soil survey for Edwards AFB also has calculated the soil erosion factor loss of soil from sheet and rill erosion. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Table 3-5 details K values and corresponding erodibility class (Coughlan et. al., 2002).

Table 3-5
K-Values and Erodibility Class for Loss of Soil due to Rill or Sheet Flow Erosion

K-Factor	Erodibility Class (Tons/Hectare/Year per Unit of Rainfall Erosivity)
<0.010	Very Low
0.010-0.020	Low
0.020-0.040	Moderate
0.040-0.060	High
>0.060	Very High

The flooding potential of a soil is indicated by its respective hydrologic soil group. Soils are classified into one of four hydrologic soil groups, A, B, C or D, with each based on the rate of water infiltration. Group A soils have a fast drainage rate when thoroughly wet. Group B soils have a moderate drainage rate when thoroughly wet. Group C soils have slow drainage rates

when thoroughly wet. Group D soils have very poor drainage rates when thoroughly wet (Soil Survey, 1996, page 122). Thus, soils in group A are less prone to flooding when compared to soils in the latter groups. Typically, flooding of soils does not occur in the hills and surrounding rock pediments or in the fan piedmonts and sand sheets due to water runoff and good drainage, respectively. Occasional ponding of water, however, may occur on the alluvial flats. Playas have poor drainage and are frequently subject to standing water (Soil Survey, 1996, pages 5-6).

3.3.2 Geology and Soils within each Corridor

Alternative 1 - Corridor 1

The Corridor 1 alternative runs from the Southern Base boundary (120th Street) to the northern boundary. It is approximately 20 miles long by 1,000 feet wide (about 2,424 acres). Quartz monzonite, Quaternary alluvium, Quaternary clay and Quaternary sand geologic formations are associated with this alternative (Figure 3-1). The Corridor 1 alternative bisects the El Mirage fault trace and faults associated with the Antelope Valley fault zone. Soils found within the Corridor 1 alternative are primarily the Helendale loamy sand with minor components of Muroc sand, Cajon-Challenger Complex, Leuhman-Challenger-Cajon Complex and Sparkhule very gravelly loam soils (Figure 3-2). All four hydrologic soil groups are found within this corridor. The flooding potential in this corridor ranges from not probable to a chance of more than 50 percent in any year (Soil Survey, 1996, page 122). The flooding potential in this corridor ranges from not probable to a chance of more than 50 percent in any year (Soil Survey, 1996, page 122).

Alternative 2 - Corridor 2

The Corridor 2 alternative begins at the western boundary of the Base at Rosamond Boulevard and runs parallel to Rosamond Boulevard. It is approximately 12 miles long by 500 feet wide (about 727 acres). Quaternary alluvium is the primary geologic formation associated with this alternative. Minor areas of quartz monzonite and Quaternary clay geologic formations are associated with this alternative (Figure 3-1). The Corridor 2 alternative bisects faults associated with the Antelope Valley fault zone and the Rosamond fault. Soils found within the Corridor 2 alternative are the Muroc sandy loam, Helendale-Randsburg Complex, Leuhman loamy sand,

Helendale find sandy loam and Lavic-Norob Complex (Figure 3-2). Hydrologic soil groups B, C and D are found in this corridor. The flooding potential in this corridor ranges from not probable to a chance of more than 50 percent in any year (Soil Survey, 1996, page 122).

Alternative 3 - Corridor 3

The Corridor 3 alternative, also known as the Shuttle Road Corridor, follows Shuttle Road at the western-most edge of the Base running from Avenue E to the south, to the northern boundary of the Base at Trotter Road. It is approximately 15.5 miles long by 1,000 feet wide (about 1,879 acres). Quartz monzonite, Tertiary tropic and a minor area of Quaternary sand and Quaternary old fan geologic formations are associated with this alternative (Figure 3-1). The Corridor 3 alternative bisects the Rosemond fault. Soils found with the Corridor 3 alternative are the Leuhman-Challenger-Cajon Complex, Leuhman-Cajon Complex, Leuhman loamy sand, Randsburg-Machone-Rock Outcrop Complex, Helendale-Cajon Complex and Destazo Complex (Figure 3-2). All four hydrologic soil groups are found within this corridor. The flooding potential in this corridor ranges from not probable to a chance of 5 to 50 percent in any year (Soil Survey, 1996, page 122).

Alternative 4 - Corridor 4

This utility corridor traverses the north eastern corner of the Base, following U.S. Route 395 where there are current electrical easements. It is approximately 2 miles long by 1,000 feet wide (about 242 acres). Quaternary alluvium, Quaternary old fan and Tertiary tropico geologic formations are associated with this alternative (Figure 3-1). Alternative 4 does not intersect any mapped fault and the Hi Vista sandy loam and Norob Complex overblown soils are associated with this alternative (Figure 3-2). Hydrologic soil groups A, B and C are found in this corridor. The flooding potential in this corridor ranges from not probable to a chance of 5 to 50 percent in any year (Soil Survey, 1996, page 122).

Alternative 5 - Corridor 5

This utility corridor begins at the northern boundary of the Base, parallels State Route 58 and terminates at the north eastern corner of the Base at Kramer Junction. It is approximately 30 miles long and is 1,000 feet wide (about 3,636 acres). Quaternary alluvium, Quaternary sand and Quaternary older alluvium are the geologic formations associated with this alternative (Figure 3-1). The Corridor 5 alternative bisects the Muroc fault and Spring fault. Helendale loamy sand, Helendale fine sandy loam, Cajon-Norob Complex, Muroc-Randsburg Complex, Norob-Complex, overblown and Cajon loamy coarse sand soils are associated with this alternative (Figure 3-2). All four hydrologic soil groups are found within this corridor. The flooding potential in this corridor ranges from not probable to a chance of more than 50 percent in any year (Soil Survey, 1996, page 122).

Alternative 6 - Corridor 6

This utility corridor runs from mid-Rosamond Boulevard and connects to either Corridor 1 or Corridor 2. It is nearly 4 miles long depending on the terminus and 500 feet wide (about 242 acres). Quaternary alluvium and quartz monzonite are the geologic formations associated with this alternative (Figure 3-1). The Corridor 6 alternative bisects the Gloster fault. The Helendale-Randsburg Complex, Helendale loamy sand and the Helendale fine sandy loam soils are associated with this alternative (Figure 3-2). Hydrologic soil groups B, C and D are found in this corridor. The flooding potential in this corridor ranges from not probable to a chance of 0 to 5 percent in any year (Soil Survey, 1996, page 122).

Alternative 7 - Corridor 9

This utility corridor is the northwestern connection from the northwestern edge of Edwards AFB and would tie into Corridor 1. This corridor is nearly 11 miles in length and 1,000 feet wide (about 1,333 acres). Quaternary alluvium and quartz monzonite are the geologic formations associated with this alternative (Figure 3-1). Corridor 9 bisects the El Mirage fault. The Destazo Complex and Randsburg-Rock Outcrop Complex soils are associated with this alternative (Figure 3-2). Hydrologic soil groups A, B and D are found in this corridor. The flooding

potential in this corridor ranges from not probable to a chance of 5 to 50 percent in any year (Soil Survey, 1996, page 122).

3.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

For purposes of this study, the terms “hazardous material” and “hazardous waste” are those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act (RCRA). A hazardous material is any material whose physical, chemical or biological characteristics, quantity, or concentration may cause or contribute to adverse effects in organisms or their offspring; pose a substantial present or future danger to the environment; or result in damage to or loss of equipment, property or personnel. Hazardous wastes are substances that have been “abandoned, recycled, or are inherently waste like,” and due to their quantity, concentration and/or characteristics, may cause increases in mortality or serious irreversible illness or pose a substantial hazard to human health or the environment if improperly treated, stored, transported or disposed of.

3.4.1 Overview

Hazardous Materials and Waste

A hazardous material is any material whose physical, chemical or biological characteristics, quantity or concentration may cause or contribute to adverse effects in organisms of their offspring; pose a substantial present or future danger to the environment; or result in damage to or loss of equipment, property or personnel. Hazardous materials and waste management activities at Edwards AFB are governed by specific environmental regulations including RCRA (42 United States Code [USC] 6901); CERCLA (42 USC 9601); the Federal Facility Compliance Act of 1992 (FFCA) (Public Law 102-386); AFI 327086, Hazardous Materials Management; 40 CFR 260-299, Storage, Treatment and Disposal of Waste; and 49 CFR 171-185, Waste Transportation and Packaging.

The use of hazardous materials results in generation of hazardous waste (e.g., paint waste, used oil, contaminated rags, etc.) and requires proper handling. The USEPA enforces the RCRA (40 CFR 260-272), which provides guidelines for the generation, storage, transportation and disposal of hazardous waste. The California Environmental Protection Agency (Cal-EPA) enforces hazardous waste laws embodied in 22 California Code of Regulations (CCR) Chapters 10-20 and the California Health and Safety Code (Section 25100). Environmental Management manages hazardous waste accumulation.

Guidelines used by Edwards AFB include the Edwards AFB Hazardous Waste Management Plan (USAF 2010b), which was prepared in accordance with AFI 32-7042, Waste Management. The Hazardous Waste Management Plan (HWMP) contains requirements for solid and hazardous waste characterization, training, accumulation, turn-in and disposal, as well as procedures for inspections, permits and recordkeeping. It is intended to ensure compliance with applicable federal, state and local regulations; simplify administrative procedures; and reduce pollution and environmental impacts through improved waste management practices.

3.5 INFRASTRUCTURE

3.5.1 Overview

Edwards AFB occupies approximately 470 square miles (over 301,000 acres) of land. The current working population is approximately 3,209 military personnel and 7,902 civilians. The Base has approximately 3,649 facilities of which approximately 870 are family housing units. The Base is generally divided into four major areas: Main Base, North Base, South Base and AFRL. The Main Base area includes Military Family Housing (MFH) areas and all other nonresidential areas (Temporary Lodging, Visiting Officers Quarters, unaccompanied housing and the cantonment area). The MFH area is subdivided into seven smaller areas (Joshua Acres, Juniper Ridge, Mesquite Meadows, Mountain View, Pacific Winds, Palo Verde Heights and Tamarisk Plains). The North Base area consists of buildings and facilities directly north and east of North Base Road. The South Base area is south of Runway 4/22 and includes areas commonly referred to as the B2 area, the area east of B2, and the Birk Flight Test Facility

(BFTF). The AFRL area is approximately 13 miles directly east of the Main Base area and houses specialized research facilities (U.S. Air Force, 2009).

Electrical

Southern California Edison (SCE) serves Edwards AFB with electrical power through its 115-kilovolt (kV) transmission system. SCE has a 230 kV–115 kV substation at Kramer Junction northeast of Edwards AFB. A 115-kV transmission line extends south to a SCE 26 Megavolt-ampere (MVA) 115–34.5 kV substation in the North Base area, adjacent to Switch Station 1. Switch Station 1 has a 34.5-kV feeder to Switch Station 1A, which has a 34.5-kV feeder to Switch Station 3. These switch stations feed the Main Base and North Base area substations (U.S. Air Force, 2009).

SCE's transmission line extends from the North Substation to a SCE 25 MVA, 115–34.5 kV substation in the South Base area, adjacent to Switch Station 4. Switch Station 4 has a 34.5-kV tie feeder to Switch Station 3 in the Main Base area. Switch Station 4 feeds the South Base and Main Base area substations, (U.S. Air Force, 2009).

A second 115-kV transmission line extends south from Kramer Junction to a SCE 50 MVA 115–34.5 kV substation in the AFRL area, adjacent to Switch Station 2. Switch Station 2 has three 34.5-kV tie feeders to Switch Station 1 in the North Base area. Switch Station 2 feeds the AFRL area substations (U.S. Air Force, 2009).

At each SCE substation, the point of demarcation is at the connection to the last insulator inside the SCE-owned and -operated substation. Electrical power is distributed on Base at 34.5 kV. The Air Force-owned distribution system is operated as a sub-transmission system. Some users take power at 34.5 kV, but the vast majority are fed through a 12.47-kV system. There are nineteen 34.5 - 12.47 kV substations and five 34.5 – 4.16 kV or 480 V substations at 16 locations throughout the Base.

Proposed Utility Corridors

- ① Alternative 1
- ② Alternative 2
- ③ Alternative 3
- ④ Alternative 4
- ⑤ Alternative 5
- ⑥ Alternative 6
- ⑦ Alternative 7

Operable Unit

- ① Main Base Flight Line
- ② South Base
- ③ Basewide Water Wells
- ④ Air Force Research Laboratory-West
- ⑤ North Base
- ⑥ NASA Dryden Flight Research Center
- ⑦ Basewide Miscellaneous
- ⑧ Northwest Main Base
- ⑨ Air Force Research Laboratory-East

EAFB Installation Boundary

EDWARDS AIR FORCE BASE

Figure 3-3
Environmental Restoration Program
Operable Units

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Natural Gas

Pacific Gas & Electric (PG&E) supplies odorized natural gas to Edwards AFB at four discrete locations across the Base through PG&E-owned pressure regulation and metering stations. Edwards AFB has four independent natural gas systems fed from each of the PG&E-owned regulator stations. These systems are the Main Base, the NASA Complex, North Base and AFRL. Natural gas is used to meet space- and water-heating requirements at Edwards AFB (U.S. Air Force 2009).

Natural gas utility mains and service lines vary from 2 to 10 feet below grade. Main Base natural gas utility mains and service lines are on average 4 feet below grade. The housing areas and the AFRL mains and service lines are on average three feet below grade. Tracer wire and marking tape are installed with the polyethylene pipe. At the Main Base and North Base, less than five percent of the natural gas system is located under paved surfaces. At the AFRL, approximately five percent of the natural gas system is located under paved surfaces.

Water

Edwards AFB obtains potable water from two primary sources: Antelope Valley East Kern (AVEK) Water Agency and groundwater from on-base wells. There are three independent water distribution systems at Edwards AFB. One of the systems serves the Main Base, North Base and South Base areas. The AVEK Water Agency supplies water to this first system from its water lines paralleling State Route 58 and Rosamond Boulevard, and through Pump Station 4004 south of the North Gate entrance. The second system serves the AFRL. The AVEK Water Agency supplies water to the AFRL system from a pump station near State Route 58 and north of the AFRL. The third system was added to the Main Base system in an amendment to the existing supply that serves the Gun Club area. The Gun Club water system is a small distribution system serving a transient population (U.S. Air Force 2009).

The existing Edwards Air Force Base water distribution system started as two separate systems (North Base and South Base). As housing areas and Main Base facilities were constructed, the systems were interconnected into one system.

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Water for Edwards AFB is provided from two different sources: surface water and well water. The AVEK Water Agency provides surface water to Edwards AFB. In addition, the Base operates several water wells.

Distribution System. Construction of the Edwards AFB water distribution system began on South Base in the early 1940s, followed by the North Base, Main Base and housing area. After its initial construction, the system has periodically been upgraded and expanded to handle increased system demands. The water system also includes service laterals, main line valves (gate valves), service valves, valve pits, manholes, fire hydrants and elevated and ground storage facilities. Water main lines and service laterals are 4 to 8 feet below grade for the Main Base, North Base and South Base areas. The Edwards AFB water distribution system supplies water for residential, industrial and fire-fighting purposes. According to a permit application dated October 1994, it serves a population of approximately 9,400 with approximately 3,357 service connections.

Storage Tanks. The Edwards AFB water distribution systems also include water-storage tanks, which provide operational flexibility during peak-flow demand periods exerted on the system, equalize system pressure and provide emergency storage capacity. Water for the Main Base, North Base and South Base areas is stored in an elevated storage tank and ground-level storage tanks. The storage tanks have a combined storage volume of approximately 5.2 million gallons.

Fire Suppression. Fire-demand requirements for specific facilities are supported by four additional storage tanks and pump stations with a total capacity of 1.2 million gallons.

Groundwater Wells. Three wellfields furnish potable water to Edwards AFB. The South Base and Main Base areas draw water from two southern supply fields (South Base and South Track). Well pumps are typically line-shaft turbines. Automatic well controls are interconnected to the tank water-level gages for well operations. The southern supply fields provide approximately 70 percent of the water for the Main Base and South Base demand. The percentage of AVEK Water Agency versus well water is governed by the current Edwards/AVEK contract limits. Before well water enters the distribution system, chlorine and polyphosphate are added for disinfection

and corrosion control. For the southern supply fields, well water treatment facilities are housed in Pump Station 791.

Pump Stations. There are 12 pump stations on Edwards AFB, most of which lift water to storage tanks or modify static pressure in a portion of the water distribution system.

Air Force Research Laboratory. The AFRL obtains water from two primary sources: the AVEK Water Agency and groundwater from on-base wells. Water system serves the laboratory, with its non-transient-type population. The system consists of piping, valves, four water wells, 13 ground-level storage tanks, four booster stations and one chlorination facility. The AFRL system contains water-storage tanks, which provide operational flexibility during the peak-flow demand periods exerted on the system, equalize system pressure and provide emergency storage capacity. The AFRL area draws water from the AFRL supply field of four wells which are located approximately equidistant between the South Base and AFRL areas.

Wastewater Treatment

The wastewater collection and treatment system at Edwards AFB provides wastewater collection, onsite treatment, and onsite disposal of treated wastewater and sludge (which is disposed of offsite) for all base facilities. There are two independent wastewater collection and treatment systems at Edwards AFB. The first system serves the Main Base, North Base and the South Base areas. The second system serves the AFRL (U.S. Air Force 2009).

Main Base. The Main Base wastewater collection system includes gravity collection pipes, force main lines and seven lift stations. Wastewater generated in the NASA complex flows to the Main Base collection system and is treated by Edwards AFB. Wastewater collection mains and service connections are an average of 4 to 8 feet below grade for the Main Base, North Base and South Base areas. On all of Edwards AFB less than five percent of the wastewater collection and treatment system is located under paved surfaces.

South Base. The South Base wastewater collection system serves the hangars and smaller buildings along the flight line. The South Base system components include gravity flow lines,

force main lines, six lift stations, the Main Waste Water Treatment Plant (WWTP) and associated evaporation ponds and the reclaimed water distribution system.

The Main Base WWTP treats wastewater from the Main Base, North Base and South Base areas. The plant was designed to treat wastewater flows to a tertiary level of wastewater treatment. The treatment processes include mechanical screening, grit removal, carousel biological treatment for extended aeration and activated sludge removal, clarifiers, flocculation and filtration and chlorination by contact chamber.

The Main Base WWTP is regulated by the California Regional Water Quality Control Board (CRWQCB), Lahontan Region, under Board Order No. 6-01-41, and WDID No. 6B150700001. The current permit has been in effect since June 13, 2001. This permit lists the allowable concentrations of treated wastewater constituents for disposal and limits the discharge volume of treated water to 1.6 million gallons per day. The Main Base WWTP requires operator certification from the California State Water Resources Control Board for a class IV facility. Treated wastewater is disposed of by evaporation or is used for irrigation. During the non-irrigation season, the discharge from the plant is transferred to five active evaporation ponds covering an area of approximately 250 acres. During the irrigation season, primary flow is to the reclaimed water system, with excess effluent flowing to the evaporation ponds.

North Base. The North Base wastewater collection system components include gravity collection pipes, forced main lines and four lift stations. Wastewater from the North Base flows to four Lift Stations (4310, 4330, 4451 and 4505) and is pumped through a forced main along Rosamond Boulevard to the Main Base area, where it discharges into the gravity collection system for transport to the WWTP.

Air Force Research Laboratory. The AFRL wastewater collection and treatment system is independent of the Main Base wastewater collection and treatment system. The AFRL wastewater collection system consists of gravity collection pipes and a 125,000-gallon-per-day wastewater treatment facility. The depth of collection lines varies between 3 and 20 feet below grade (U.S. Air Force 2009).

The AFRL WWTP produces a tertiary effluent. After treatment, the effluent is pumped to one of four 100-foot by 200-foot evaporation ponds for disposal. Sludge produced at the AFRL is combined with the sludge from the Main Base Treatment Plant and disposed of off-site at a licensed facility.

The AFRL WWTP is regulated by the CRWQCB, under Board Order No. 6-99-33 and WDID No. 6B150700002. The current permit has been in effect since March 9, 1995. The AFRL WWTP requires operator certification from the California State Water Resources Control Board for a class III facility. The WWTP is operated by a private firm under contract to the Air Force. The Air Force maintains the permit and currently does the sampling and reporting. The Air force intends to transfer the permit if the system is privatized.

Storm Drainage System

Storm water is collected and transmitted through earthen channels and drainage structures. These structures direct surface water to either the dry lakebed or storm water retention ponds. The flightline storm water retention pond was eliminated due to bird airstrike hazard (BASH). With the exception of the AFRL area, most development has occurred in low-lying areas along the western perimeter of Rogers Dry Lake. Storm water runoff reaching these areas requires collection and removal (U.S. Air Force 2009).

The storm water drainage system consists primarily of drainage ditches with some storm sewer structures in the developed areas. These ditches and storm sewers generally flow west to east and empty into the Rogers Dry Lake, or the storm water retention ponds east of the Main Base flightline. Storm water runoff in undeveloped areas flows into the nearest dry lake.

The topography of Edwards AFB prevents the efficient use of traditional storm water drainage improvements. The level terrain prevents flows from achieving velocities sufficient to keep the channels clear. The easily eroded soil in the undeveloped, upstream areas of the base tends to cause the drainage channels to fill with silt, leading to flooding. Additionally, Rogers Dry Lake has bottom elevations only slightly lower than those of the storm water channels entering it; therefore, flooding must be anticipated. Areas prone to flooding include Rogers Dry Lake,

Rosamond Dry Lake, Mojave Creek and portions of the Military Family Housing area as well as low-lying areas in the Main Base industrial area.

Transportation Systems

Regional and Local Network

One U.S. highway and two state highways connect Edwards AFB to the local communities and the interstate highway system. U.S. Route 395 parallels and crosses into the eastern boundary of Edwards AFB and connects to Interstate 15, 40 miles to the south in San Bernardino county and Interstate 80, 380 miles to the north in Reno, Nevada. California State Route 58 parallels and crosses into the northern boundary and connects to Interstate 15, 50 miles east in Barstow, and Interstate 5, 77 miles west in Bakersfield. California State Route 14 (Antelope Valley Freeway) parallels the western boundary intersecting State Route 58 at Mojave at the northwestern corner of the installation and connects to Interstate 5, 53 miles to the south. The California Department of Transportation has developed plans for enhancing both U.S. Route 395 and State Route 58.

Commercial air transportation is available at seven airports within a 130-mile radius of the installation: Palmdale Regional Airport (35 miles), Burbank-Glendale-Pasadena Airport (83 miles), Ontario International Airport (87 miles), Bakersfield Municipal Airport (90 miles), Los Angeles International Airport (105 miles), Long Beach Airport (117 miles) and Oxnard Airport (127 miles). A commercial shuttle is available from Lancaster to the airports or privately owned vehicles may be used on a reimbursable basis.

Freight rail service is provided to the installation by the Burlington Northern & Santa Fe Rail Line from its main line paralleling the northern boundary. A rail spur from Edwards AFB Station connects the government-owned rail servicing the Main Base petroleum, oil, lubricant (POL) storage area. The base-owned rail spurs are required to be certified every two years.

Installation Network

Vehicular traffic accesses the installation through three gates. West Gate is located on Rosamond Boulevard approximately 9 miles from the western boundary and handles 47 percent of all base traffic. South Gate is located on Lancaster Boulevard approximately 2 miles from the

southern boundary and handles 18 percent of all base traffic. The North Gate is located on Rosamond Boulevard at the northern boundary and handles 35 percent of all base traffic. Figure 3-4 shows the current transportation network on and around the base.

Edwards AFB has two primary roads, Rosamond and Lancaster Boulevards, which carry the majority of base traffic. Four secondary roads distribute traffic from the primary roads to the residential areas, flightline areas, North and South. These are Forbes Avenue, Wolfe Avenue, Yeager Boulevard and Fitz-Gerald Boulevard. Fitz-Gerald Boulevard provides primary access to the Commissary, Army Air Force Exchange Service and base housing. Jones Road and North Base Road are the sole access routes from a primary road (Lancaster Boulevard) to existing activity areas. Mercury Boulevard and Rich Road are the two primary roads accessing the AFRL. All other roads are classified as tertiary, feeder or unpaved roads serving individual areas on the installation.

The Main Base rail spur connecting to the Burlington Northern & Santa Fe rail line is routed south along Rosamond Boulevard to the Base POL storage area. A separate spur services the Air Force Research Laboratory (AFRL). Edwards AFB and the AFRL are capable of handling cargo shipped by rail.

Communication Systems

The communication system throughout Edwards AFB is found in association with the existing electrical infrastructure and includes underground conduit, copper wire and fiber-optic lines, electrical transmission lines, switch stations and access manholes (United States Fish and Wildlife Service 1995).

3.5.2 Infrastructure within or near Each Corridor

Alternative 1 - Corridor 1

Corridor 1 spans from the Southern Base boundary (120th Street) to the northern boundary. It is approximately 20 miles long by 1,000 feet wide (about 2,424 acres). The corridor follows the natural contours of the terrain and avoids large and tall land masses. Suitable utilities that could

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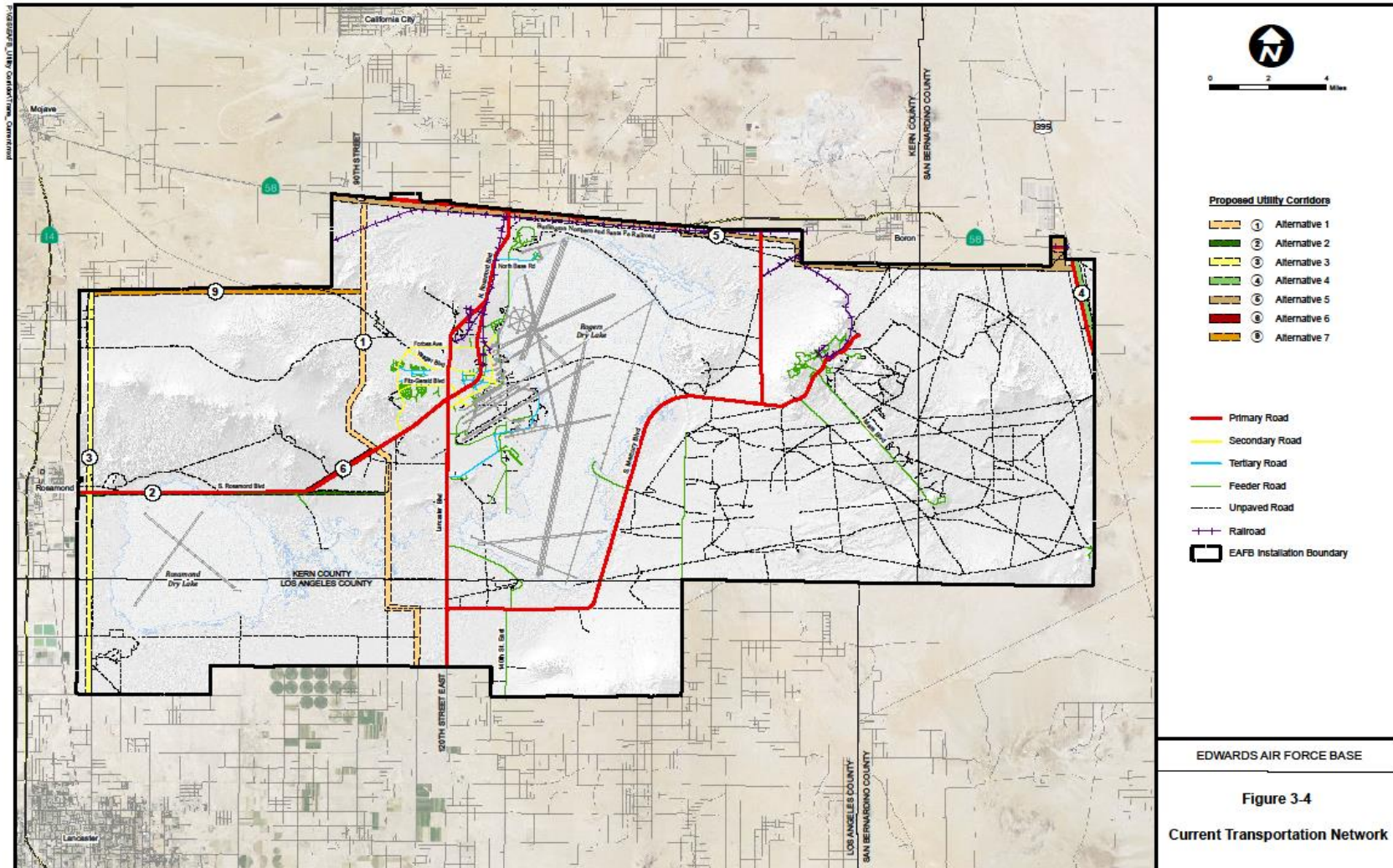


Figure 3-4 Current Transportation Network

be included in this alternative include underground natural gas, water, communication, and electrical or power transmission lines (EAFB, 2012b).

Alternative 2 - Corridor 2

Corridor 2 begins at the western boundary of the Base at Rosamond Boulevard and runs parallel to Rosamond Boulevard. It is approximately 12 miles long by 500 feet wide (about 727 acres) in order to maintain integrity where it crosses Rosamond Dry Lake. This corridor crosses the CATM firing fan but follows an existing communications infrastructure utility corridor. There are existing utilities present in this corridor and suitable utilities that may be included in this alternative are buried communication, electrical, power transmission, and waterlines (EAFB, 2012b).

Alternative 3 - Corridor 3

Corridor 3, also known as the Shuttle Road Corridor, follows Shuttle Road at the western-most edge of the Base running from Avenue E to the south, to the northern boundary of the Base at Trotter Road. It is approximately 15.5 miles long by 1,000 feet wide (about 1,879 acres). Suitable utilities that could be included in this corridor are underground gas, water, communication, electrical or power transmission lines (EAFB, 2012b).

Alternative 4 - Corridor 4

Corridor 4 traverses the northeastern corner of the Base, following U.S. Route 395 where there are current electrical easements. It is approximately 2 miles long by 1,000 feet wide (about 242 acres). Suitable utilities in this corridor are buried communication, electrical, power transmission and water lines (EAFB, 2012b).

Alternative 5 - Corridor 5

Corridor 5 begins at the northern boundary of the Base and parallels State Route 58 and terminates at the north eastern corner of the Base at Kramer Junction. It is approximately 30 miles long and is 1,000 feet wide (about 3,636 acres). This utility corridor follows other active

easements. Suitable utilities for this corridor include buried communication, electrical, power transmission and water lines (EAFB, 2012b).

Alternative 6 - Corridor 6

Corridor 6 runs from mid-Rosamond Boulevard and connects to either Corridor 1 or Corridor 2. It is nearly 4 miles long depending on the terminus and 500 feet wide (about 242 acres). Suitable utilities for this corridor include buried communication, electrical, power transmission and water lines (EAFB, 2012b).

Alternative 7 - Corridor 9

Corridor 9 is the northwestern connection from the northwestern edge of the Base to tie into Corridor 1. This corridor is nearly 11 miles in length and 1,000 feet wide (about 1,333 acres). Suitable utilities for this corridor include buried communication, electrical, power transmission and water lines (EAFB, 2012b).

3.6 LAND USE

This section provides an overview of the existing land use conditions at Edwards AFB and within each proposed utility corridor. The utility corridors are located within Kern County, Los Angeles County and San Bernardino County.

3.6.1 Overview

Regional Setting

Edwards AFB is located approximately 100 miles north of Los Angeles in the Antelope Valley on the western edge of the Mojave Desert. Portions of the installation are within three California counties. The majority of the installation is in Kern County, with smaller areas located within Los Angeles and San Bernardino Counties. The installation encompasses approximately 481 square miles (over 301,000 acres) and includes two major natural features, Rogers and Rosamond Dry Lakes (EAFB, 2012b).

Installation Land Use

Land use categories follow the Land Improvement Codes conforming to Department of Defense Instruction (DODI) 4165.14 which established real property inventory requirements (RPIR) in an effort to standardize operational definitions and business rules for all DOD real property assets. Only those RPIR land use categories applicable to Edwards AFB are listed in the following description. Each category of land use indicates the predominant use of the facilities or land within that area. A definition of these land uses is provided in Table 3-6, (EAFB, 2012b).

Table 3-6
Department of Defense Land Use Definitions

Name	Definition
Airfield	Land used for military air bases or air stations and military or civilian landing fields.
Communications System	Land used for telephone and telgraph lines, data transmission lines, satellite communications and other communications facilities or towers.
Forest and Wildlife	Conservation land primarily administered to preserve, protect, manage, or develop timber, wildlife, watershed and recreational resources including wetlands and floodplains.
Housing	Land used primarily for public housing projects, military personnel quarters and dwellings for other federal personnel.
Institutional	Land used for institutional purposes such as hospitals, prisons, schools, libraries, chapels and museums.
Miscellaneous Military Land	DOD and U.S. Coast Guard (USCG) controlled land used for military functions that cannot be classified elsewhere.
Navigation and Traffic Aids	Land used for aircraft and ship navigation aids, such as beacon lights, antenna systems, control approach systems and obstructing lighting.
Office Building Locations	Land containing office buildings for future planned office buildings to include military headquarters buildings.
Other	Land that cannot be classified elsewhere.
Parks and Historic Sites	Land administered for cemeteries, memorials, monuments, parks, parkways and recreation areas, excluding wilderness areas.
Post Office	Land used in conjunction with a Post Office and used predominantly as a general service and access area.
Research and Development	Land used directly in basic or applied research such as science, medicine and engineering.
Storage	Land used primarily for supply depots and other storage.
Training Land	Land containing training buildings or land that is used to conduct outdoor training, such as firefighting, weapons training or other military training activities.

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Name	Definition
Vacant	Land not being used.

Off-Installation Land Use

The land adjacent to the installation consists of rapidly growing communities and arid desert. The communities of Boron, California City, Lancaster, Mojave, Palmdale and Rosamond pose potential encroachment threats if growth is not properly managed. The potential encroachment could interfere with the mission of Edwards AFB.

Coordinating with local communities will serve to ensure all communications towers, wind turbines, residential development and other potentially incompatible land uses within the R-2508 Complex do not conflict with military operations.

Transportation

Land use patterns set the need for transportation networks. Conversely, transportation networks provide accessibility between the local community and the installation and among the various land use areas on Base. Existing transportation systems are discussed in detail in Section 3.5.1.6.

3.6.2 Land Use Within or Near Each Corridor

Alternative 1 - Corridor 1

This utility corridor spans from the Southern Base boundary (120th Street) to the northern boundary. It is approximately 20 miles long, by 1,000 feet wide (about 2,424 acres). Corridor 1 is found in largely undeveloped lands that are designated as Parks and Historic Sites, Forest and Wildlife. Portions of this alternative are used as training lands.

Alternative 2 - Corridor 2

This utility corridor begins at the western boundary of the Base at Rosamond Boulevard and runs parallel to Rosamond Boulevard. It is approximately 12 miles long and is 500 feet wide (about

727 acres) so as to maintain the integrity of the dry lake bed. Corridor 2 parallels Rosamond Boulevard, but is found in largely undeveloped lands. A portion of these lands are used for training and predominate land use for this alternative is for research and development.

Alternative 3 - Corridor 3

This utility corridor, also known as the Shuttle Road Corridor, follows Shuttle Road at the western-most edge of the Base running from Avenue E to the south, to the northern boundary of the Base at Trotter Road. The corridor is approximately 15.5 miles in length and 1,000 feet wide (about 1,879 acres). Alternative 3, Corridor 3 would be located in undeveloped lands identified for use for research and development.

Alternative 4 - Corridor 4

This utility corridor traverses the north eastern corner of the base, following Highway 395 where there are current electrical easements. The corridor is approximately 2 miles long and 1,000 feet wide (about 242 acres). Corridor 4 parallels Highway 395 but is undeveloped. Lands in this alternative have been identified for use for research and development.

Alternative 5 - Corridor 5

This utility corridor begins at the northern boundary of the Base and parallels Highway 58 and terminates at the north eastern corner of the Base at Kramer Junction. It is approximately 30 miles long and is 1,000 feet wide (about 3,636 acres). Corridor 5 is in undeveloped lands that are designated as Forest and Wildlife.

Alternative 6 - Corridor 6

This utility corridor runs from mid-Rosamond Boulevard and connects to either Corridor 1 or Corridor 2. It is nearly 4 miles long depending on the terminus and 500 feet wide (about 242 acres). Corridor 6 is in undeveloped lands that are used for training and have been identified as miscellaneous military land. Lands within this corridor have also been identified as Parks and Historic sites plus Forest and Wildlife.

Alternative 7 - Corridor 9

This utility corridor is the northwestern connection from the northwestern edge of the Base to tie into Corridor 1. This corridor is nearly 11 miles in length and 1,000 feet wide (about 1,333 acres). Corridor 9 is in undeveloped lands that have been identified for use as research and development and also as Parks and Historic sites.

3.7 NATURAL RESOURCES

The following section provides information on the vegetation and wildlife occurring on Edwards AFB, including endangered, threatened and special-status species. The analysis of the proposed project's potential impacts on natural resources, as well as the recommendations for avoidance, reduction of, or mitigation measures necessary to address these potentially adverse impacts are provided in Section 4.7.

3.7.1 Overview

Edwards AFB lies in the southwestern Mojave Desert, which is located within the intermountain Semidesert and Desert Province and forms its own ecoregion (Bailey, 1994). The Mojave Desert ecoregion is bounded by other ecoregions; including the Great Basin to the north, Apache Highlands to the East, Sierra Nevada and South Coast to the west, and the Sonoran Desert to the south and southeast. The Mojave Desert is situated within the borders of four western states, extending from southwestern Utah across to southern Nevada to southeastern California, and over to western and northwestern Arizona (Edwards Air Force Base, 2015; The Nature Conservancy, 2001).

The information provided in this section is based primarily on previous field surveys of Edwards AFB and information in the Edwards AFB Integrated Natural Resources Management Plan (INRMP) (Edwards Air Force Base, 2008 and 2015). These surveys were conducted in order to identify endangered, threatened and special-status species on Edwards AFB and to provide a baseline for the species that could occur within the proposed utility corridors.

3.7.2 Vegetation

Edwards AFB vegetation communities are described in the 2015 Integrated Natural Resources Management Plan (INRMP) for the Base in terms of zonal and azonal communities (Edwards Air Force Base, 2015). Zonal plant communities are primarily based upon elevation and typically contain drier soils. At Edwards AFB, upland zonal plant communities consist of creosote bush scrub and Joshua tree woodland. Lowland zonal communities consist of alkali sink and saltbush communities. Azonal plant communities are communities of limited geographic area, but not necessarily limited by elevation. Edwards AFB also supports azonal habitats such as claypan, sand dunes and mesquite woodlands. Comprehensive lists of plant species found on the Base are located in Appendix B of the INRMP.

Vegetation communities on the portions Edwards AFB proposed for utility corridors are shown on Figure 3-5 and include Joshua tree woodland, creosote bush scrub, saltbush scrub (halophytic saltbush scrub and xerophytic saltbush scrub), mesquite woodland and playa and claypans. These vegetation communities are discussed below. The acreage of each vegetation community present in each utility corridor is presented in Table 3-7.

Table 3-7 Vegetation Community Acreage within Utility Corridors

	Joshua Tree Woodland	Creosote Bush Scrub (acres)	Saltbush Scrub (acres)	Mesquite Woodland (acres)	Playas and Claypans (acres)
Corridor 1	-	571.2	1,612.2	5.0	-
Corridor 2	-	208.7	285.9	-	145.1
Corridor 3	-	473.5	1,231.6	-	-
Corridor 4	27.6	312.5	2.5	-	-
Corridor 5	712.3	705.7	1,093.3	-	137.0
Corridor 6	-	271.8	-	-	-
Corridor 9	215.9	-	884.7	-	-

In addition to the vegetation communities described in the INRMP, the 1980 Los Angeles County General Plan (1980 Plan) established 61 Significant Ecological Areas (SEAs) that represent a wide variety of biological communities within the County. These areas have special management concerns. The 1980 Plan identified two SEAs on the Base, Edwards Air Force

Base (SEA 47) and Rosamond Lake (SEA 50). SEA 47 contains botanical features that are unique and limited in distribution in Los Angeles County. They include the only good stands of mesquite in Los Angeles County, which provide habitat for a variety of mammals, birds and reptiles. SEA 47 also contains fine examples of creosote bush scrub, alkali sink and the transition vegetation between the two. More information on mesquite woodlands and creosote bush scrub at Edwards AFB is provided below. SEA 50 is an example of the shadscale scrub and alkali sink biotic communities in Los Angeles County and encompasses Rosamond Dry Lake in the southwestern corner of the Base. Further discussion of playa and claypans at Edwards AFB, which include Rosamond and Rogers Dry Lakes is provided below. The southern portion of Corridor 1 crosses SEA 47 and the southern portion of Corridor 3 crosses SEA 50. In 2012, Los Angeles County revised the 1980 Plan as a draft; in this draft plan, SEA 47 and 50 are now combined under the larger Antelope Valley SEA (<http://planning.lacounty.gov/sea/biological>) (Figure 3-6).

Joshua Tree Woodland

Joshua trees (*Yucca brevifolia*) generally occur in deep, sandy soils or in shallow, rocky soils on steep hillsides. Joshua tree woodland occurs in the higher elevations of the east side of Edwards AFB, with the largest expanse in the PIRA. Joshua tree woodland does not have a distinctive understory of shrubs. The only difference between scrub and woodland is the presence of the trees in sufficient density to visually become woodland, which is defined on Edwards AFB as 10 trees per acre. The main understory shrub vegetation is saltbush or creosote. Annual plant diversity in this community is normally high. Guilds of wildlife species are specifically attracted to Joshua trees. These vary from insects, such as pollinators, to reptiles and many species of birds (Edwards Air Force Base, 2015). Special status species that occur in Joshua treewoodlands include white pygmy poppy (*Canbya candida*) and Mojave spineflower (*Chorizanthe spinosa*). Joshua tree woodlands are a rare and important feature of Edwards AFB (Edwards Air Force Base, 2008). Corridors 4, 5 and 9 pass through Joshua tree woodland.

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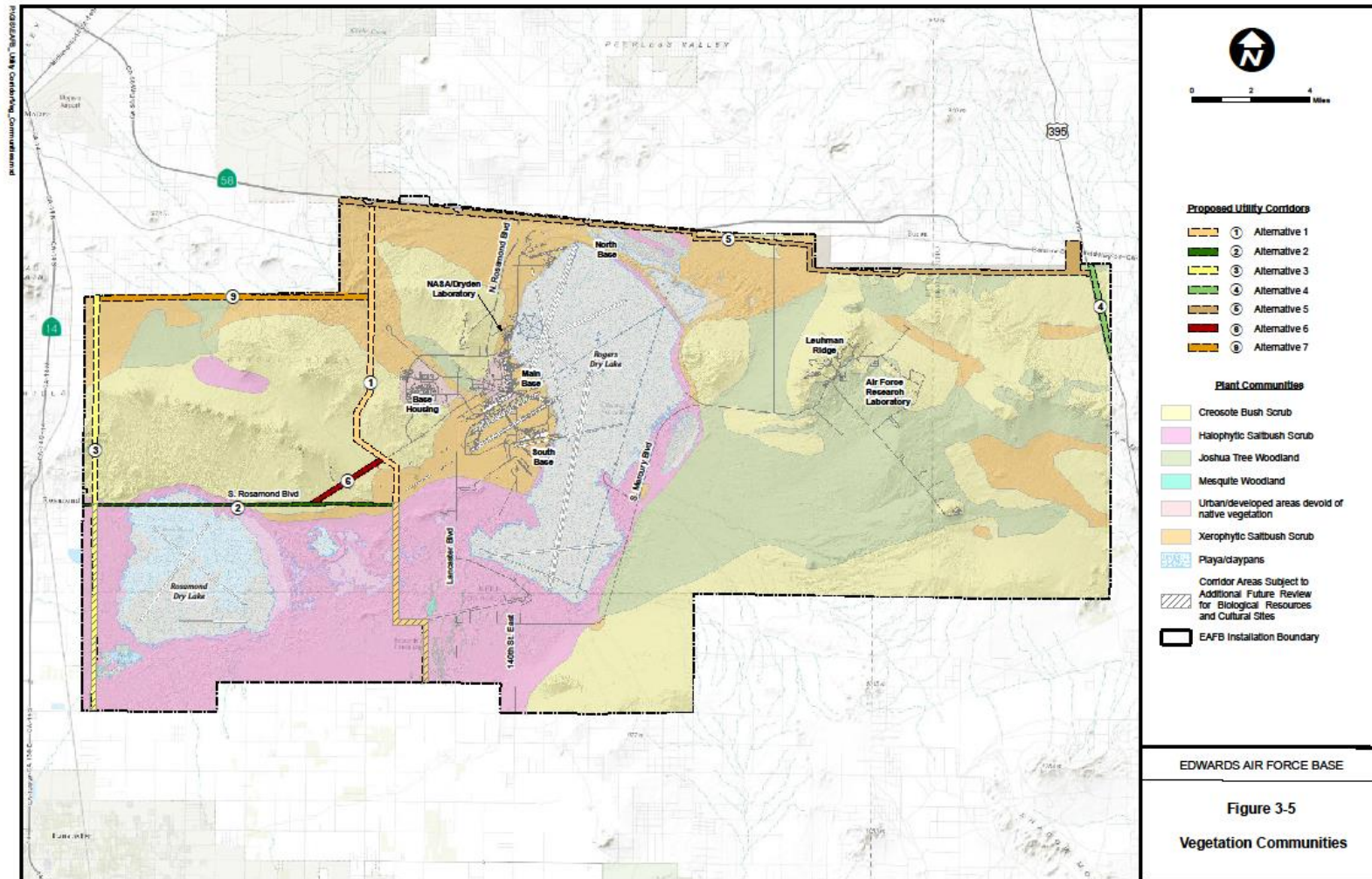


Figure 3-5 Vegetation Communities

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Edwards Air Force Base, California

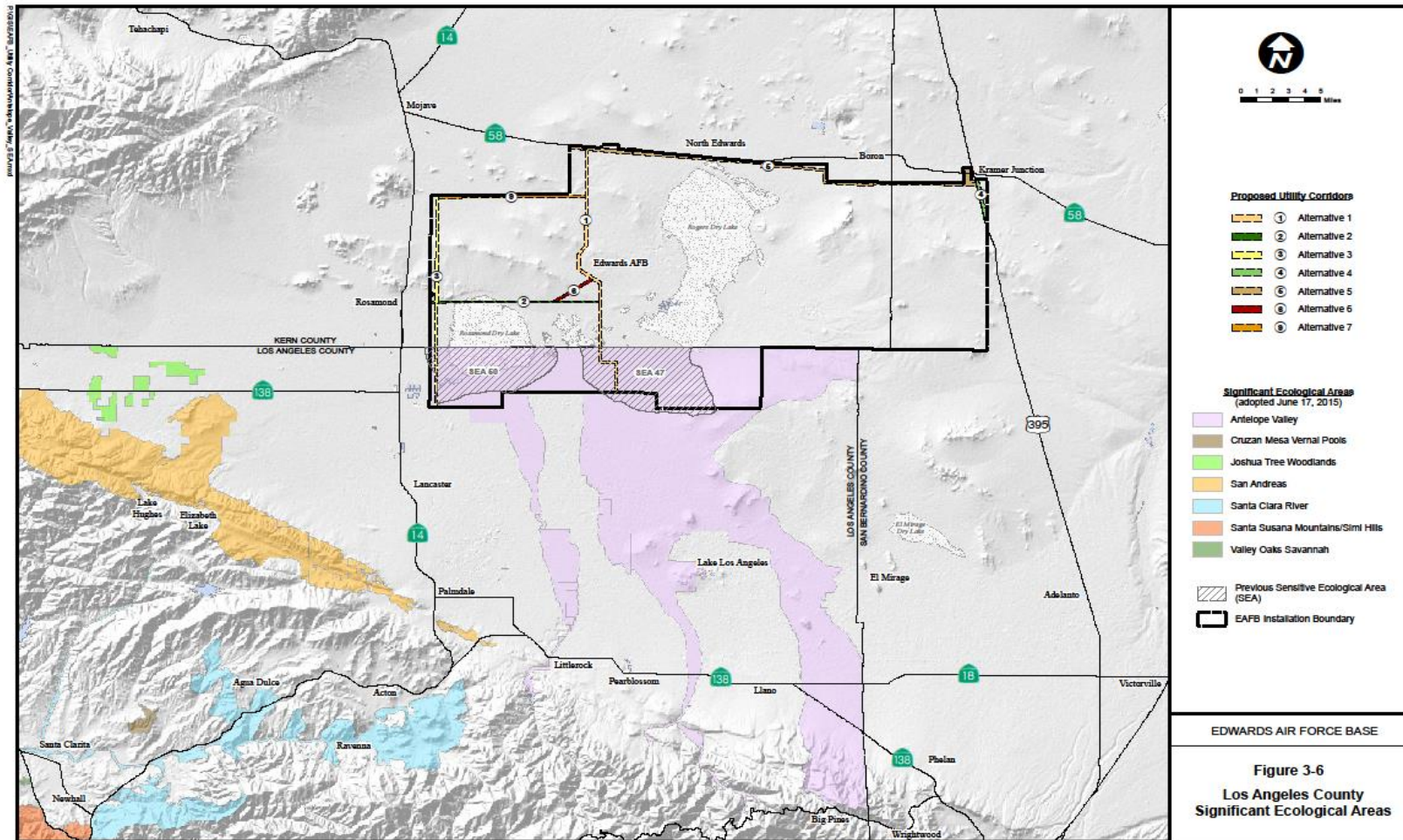


Figure 3-6 Los Angeles County Significant Ecological Areas

Creosote Bush Scrub

Approximately 40% of the natural vegetation community on Edwards AFB is creosote scrub. In general, the creosote scrub community tends to occur on soils that are well drained and range from sandy loam to rock and cobble. Shrub composition within this community varies widely and appears to be dependent on soil type. The creosote scrub community usually tends to have large shrub interspaces with a high density of annuals in the spring (Edwards Air Force Base, 2015).

Creosote bush scrub below 2,300 feet can be visually dominated by Joshua trees without having them form a woodland. In higher elevations, creosote bush scrub is dominated by creosote bush (*Larrea tridentata*) and burrobush (*Ambrosia dumosa*). Shrubs that begin appearing in sandy soils include winterfat (*Krascheninnikovia lanata*), spiny hopsage (*Grayia spinosa*), goldenheads (*Acamptopappus sphaerocephalus*), Mojave cottonthorn (*Tetradymia stenolepis*) and Cooper's goldenbush (*Ericameria cooperi*). Species more common in rocky soils on the hillsides include Mojave aster (*Xylorhiza tortifolia*), green rabbitbrush (*Ericameria teretifolia*), Anderson thornbush (*Lycium andersonii*) and Nevada Mormon tea (*Ephedra nevadensis*). Creosote bush scrub is present in Corridors 1, 2, 3, 4, 5 and 6.

Saltbush Scrub

Historically, saltbush scrub has been divided into two communities, xerophytic and halophytic. Halophytic communities occur at lower elevations adjacent to lakebeds, claypans and drainages. Xerophytic communities are generally located at slightly higher elevations than halophytic communities. Xerophytic communities are dominated by allscale (*Atriplex polycarpa*) and halophytic communities by shadscale (*Atriplex confertiflora*) or spinescale (*Atriplex spinifera*). The depth of sand deposits determines the diversity of plant species in the saltbush communities (U.S. Army Corps of Engineers [USACE], 2004). Highly eroded sandy hummocks are dominated by shadscale (*Atriplex confertifolia*) and alkali sacaton (*Sporobolus airoides*). Clay soils within saltbush scrub are dominated by native annual goldfields (*Lasthenia gracilis*), while the dunes contain numerous annual species, some primarily occurring on sand, such as dune

evening primrose (*Oenothera primiveris*), desert sand verbena (*Abronia villosa*), desert lupine (*Lupinus shockleyi*), California croton (*Croton californicus*), fanleaf crinklemat (*Tiquilia plicata*), hole-in-the-sand plant (*Nicolletia occidentalis*), scaly sandfood (*Pholisma arenarium*) and tickseed (*Dicoria canescens*). Several special-status plant species occur in the sand fields and dunes near the lakebed on Edwards AFB, such as sagebrush loeflingia (*Loeflingia squarrosa*), desert cymopterus (*Cymopterus deserticola*), yellow spiny cape (*Goodmania luteola*), Hoover's woollystar (*Eriastrum hooveri*), red rock poppy (*Eschscholzia minutiflora* ssp. *twisselmannii*), Barstow woolly sunflower (*Eriophyllum mohavense*) and Lancaster milkvetch (*Astragalus preussii*). A few special-status species are found in the clay drainages and sandy hummocks adjacent to the various small or large playas, such as the alkali mariposa lily (*Calochortus striatus*), Rosamond eriastrum (*Eriastrum rosamondense*) and Coves' cassia (*Senna covesii*). Saltbush scrub occurs along Corridors 1, 2, 3, 4, 5 and 9. More specifically, both xerophytic and halophytic communities are found in Corridors 1, 2, 3, 5 and 6. Corridors 4 and 9 only have the xerophytic saltbush scrub community.

Mesquite Woodland

Mesquite woodland (*Prosopis glandulosa*) visually dominates some of the largest drainages within Edwards AFB (Figure 3-7), as well as Big and Little Rock Creeks as they approach Rogers Dry Lake. The treelike spiny shrubs form habitat for some riparian woodland species of wildlife. This vegetation community is composed of Mojave rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *mohavensis*), alkali mariposa lily (*Calochortus striatus*) and the local endemic Parish's sagebrush (*Artemisia tridentata parishii*) (Edwards Air Force Base, 2015). The 2008 INRMP describes mesquite woodland as an important and rare feature of Edwards AFB (Edwards Air Force Base, 2008) and Los Angeles County has recognized the mesquite woodland as "the only good stands of mesquite (*Prosopis glandulosa*) in the County" (Los Angeles County General Plan, 1980). Mesquite woodland occurs within Corridor 1.

Playa and Claypan

During seasons with above average rainfall, playas and claypans provide habitat for aquatic invertebrates, such as fairy shrimp, that are eaten by migrating wading birds. Playas and claypans occur azonally within many of the vegetation communities listed above. Alkali mariposa lily is a special-status species that is limited to clay drainages and sandy hummocks adjacent to various small or large playas. The largest playas at Edwards AFB are Rosamond Dry Lake and Rogers Dry Lake. The special status species Rosamond eriastrum (*Eriastrum rosamondense*) occurs within the Rogers Dry Lake area along alkaline hummocks. The special status species Coves' cassia (*Senna covesii*) occurs within this habitat to the northwest of Rogers Dry Lake. Playa and claypan areas are found along Corridors 1, 2 and 5.

3.7.3 Wildlife Communities

Wildlife occurring in the areas of the utility corridors includes insects, reptiles, birds and mammals. No fish occur naturally on Edwards AFB and none are likely to be found in the area of the proposed project. Amphibians are not likely to be found at or adjacent to the proposed utility corridors due to a lack of potential habitat. Comprehensive lists of wildlife species found on the Base are found in Appendix B of the INRMP. Additional details on common wildlife species that may occur in or adjacent to the proposed utility corridors are provided below.

Insects and Arthropods

Commonly observed insects include wasps, ants, bees, flies, grasshoppers, moths, butterflies and beetles. Arthropods present on Edwards AFB typically include spiders (tarantulas and wolf spiders), scorpions and fairy shrimp. Based on numerous biological shrimp surveys, there are five common species of shrimp that occur in the playas and adjoining claypan areas where ponded water collects from rainfall. These include three species of fairy shrimp (*Branchinecta gigas*, *B. mackini* and *B. lindahli*); one species of tadpole shrimp (*Lepidurus lemmoni*); and one species of clam shrimp (*Eocyzicus digueti*). To date, there are no known threatened or endangered shrimp species on Base.

Mammals

Mammal species common to the area of Edwards AFB where the corridors are proposed include bats such as the California myotis (*Myotis californicus*) and Townsend's western big-eared bat (*Corynorhinus townsendii*); carnivores such as the coyote (*Canis latrans*), desert kit fox (*Vulpes macrotis*), bobcat (*Lynx rufus*) and American badger (*Taxidea taxus*); and rodents, rabbits and hares including the black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), desert woodrat (*Neotoma lepida*), Merriam's kangaroo rat (*Dipodomys merriami*), white-tailed antelope ground squirrel (*Ammospermophilus leucurus*) and Mohave ground squirrel (*Xerospermophilus mohavensis*; which is discussed further in Section 3.7.4 below).

Birds

Almost all bird species found on Edwards AFB are covered by the Migratory Bird Treaty Act (MBTA). The MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. The migratory bird species protected by the Act are listed in 50 CFR 10.13. Bird species expected to be observed within the utility corridors include California quail (*Callipepla californica*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), American kestrel (*Falco sparverius*), burrowing owl (*Athene cunicularia*; discussed further in Section 3.7.4 below), mourning dove (*Zenaida macroura*), greater roadrunner (*Geococcyx californianus*), Anna's hummingbird (*Calypte anna*), ladder-backed woodpecker (*Picoides scalaris*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), cactus wren (*Campylorhynchus brunneicapillus*) and white-crowned sparrow (*Zonotrichia leucophrys*).

Reptiles

Reptiles common to Edwards AFB that are likely to be found in the areas of the utility corridors include the desert horned lizard (*Phrynosoma blainvillii*; discussed further in Section 3.7.4

(*Callisaurus draconoides*), coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), Mojave green rattlesnake (*Crotalus scutulatus*), sidewinder (*Crotalus cerastes*) and the desert tortoise (*Gopherus agassizii*; discussed further in Section 3.7.4 below).

3.7.4 Sensitive Species and Habitats

Sensitive species included in this document are those listed by the federal, state or local governments or those in planning processes as endangered, threatened or otherwise of conservation concern, including:

- Species listed by the California Native Plant Society (CNPS);
- Species designated as either rare, threatened, or endangered by California Department of Fish and Wildlife (CDFW) or the US Fish and Wildlife Service (USFWS) and are protected under either the California or Federal Endangered Species Acts;
- Candidate species or species being considered or proposed for listing under these same Acts;
- Species listed as birds of conservation concern (BCC) by USFWS;
- California species of special concern (SSC) listed by CDFW; and/or
- Species addressed in the West Mojave Plan (WEMO).

Sensitive habitats include those listed by federal, state and/or local planning processes as being of local or regional conservation concern, including:

- Areas of designated critical habitat;
- Desert Wildlife Management Areas (DWMAs) and other Areas of Critical Environmental Concern (ACECs) designated by the US Department of the Interior, Bureau of Land Management (BLM);
- Plant communities listed as sensitive by CDFW and other resources agencies;
- Plant communities rare or declining and of concern to agencies or local jurisdictions;
- Significant Ecological Areas designated by Los Angeles County (refer to Section 3.7.2);
- Potential wildlife movement corridors; and

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- Potential wetlands or other jurisdictional waters. While there are no jurisdictional wetlands or waters on Edwards AFB, there are biological wetlands, including at the Piute Ponds Complex.

Edwards AFB supports approximately 14 species of sensitive plants (Table 3-8) and 29 species of sensitive wildlife (Table 3-9) (Edwards Air Force Base, 2015). Not all of these species have the potential to be present in every proposed utility corridor based on habitats present in each corridor. Figure 3-7 shows the presence of some of these species in Edwards AFB and the surrounding area. Each species has been given a potential to occur based on the following criteria:

Present	Species was observed during a survey in the past five years.
High	Both a historical record exists of the species within the boundaries of the site or its immediate vicinity (approximately one mile) and the environmental conditions (including vegetation, soil type and elevation factors) associated with the species are found at the site.
Moderate	Either a historical record exists of the species within the immediate vicinity of the site or the environmental conditions associated with species are found at the site.
Low	No records exist of the species occurring within the site or its immediate vicinity and/or the environmental conditions associated with species presence are marginal within the site.
Absent	Species was not observed during focused surveys conducted within the site at an appropriate time and/or the environmental conditions associated with species presence do not exist on or adjacent to the site.

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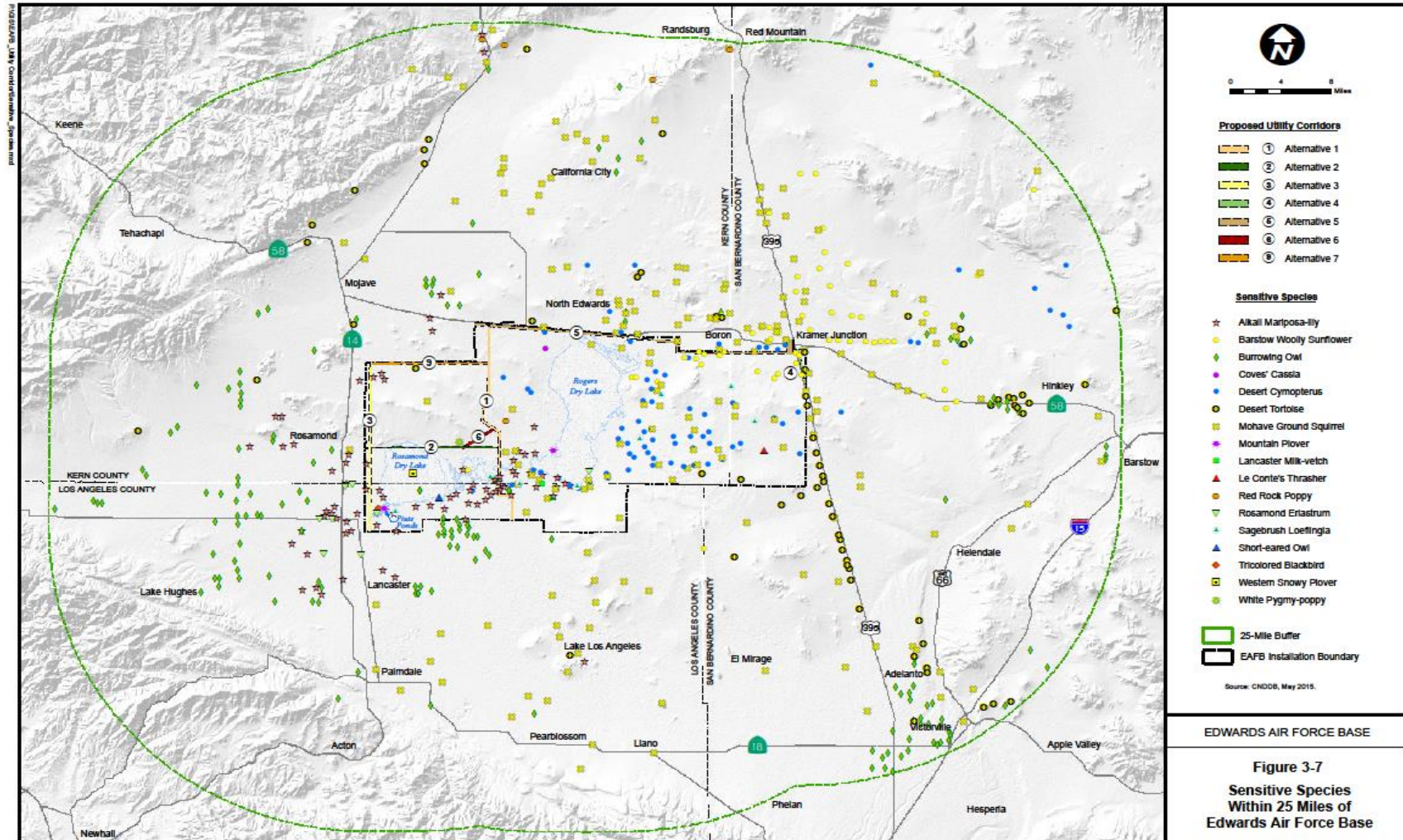


Figure 3-7 Sensitive Species Within 25 Miles of Edwards Air Force Base

Sensitive Plant Species

The CNPS documents sensitive plant species into California Rare Plant Ranks. Table 3-8 lists the species that fall under the California Rare Plant Ranks that may occur in the proposed utility corridors.

Figure 3-8 shows the locations of these rare species throughout Edwards AFB.

Further information on the presence of special-status plant species in each corridor is provided in Section 4.7.

Table 3-8 Special Status Species Potential for Occurrence - Plants

Scientific Name Common Name	Status	Flowering Period/ Habitat	Potential for Occurrence
<i>Astragalus preussii</i> Lancaster milkvetch	Federal: None State: None CNPS: 1B.1	March – May Areas of high water table in saltbush scrub; occurs in lowlands south of Rogers Dry Lakebed on Edwards AFB	Present
<i>Calochortus striatus</i> Alkali mariposa lily	Federal: None State: None CNPS: 1B.2	April – June Claypans and sand dunes in saltbush scrub, drainages	Present
<i>Canbya candida</i> White pygmy poppy	Federal: None State: None CNPS: 4.2	March – June Joshua tree woodlands; gravelly, sandy granitic soils; Mojave desert scrub	High
<i>Chorizanthe spinosa</i> Mojave spineflower*	Federal: None State: None CNPS: 4.2	March – May Joshua tree woodlands; sandy soils	Present
<i>Cymopterus deserticola</i> Desert cymopterus	Federal: None State: None CNPS: 1B.2	March – May Joshua tree woodlands; sandy soils	Present
<i>Delphinium recurvatum</i> Recurved larkspur	Federal: None State: None CNPS: 1B.2	March – June Alkaline soils, chenopod scrub, cismontane woodlands, grasslands; known to occur in northwest section of Edwards AFB	High
<i>Eriastrum rosamondense</i> Rosamond eriastrum	Federal: None State: None CNPS: 1B.1	April – July Known only from the general area southwest of Edwards AFB; occurs on alkaline hummocks and vernal pool edges	High

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Scientific Name Common Name	Status	Flowering Period/ Habitat	Potential for Occurrence
<i>Eriophyllum mohavense</i> Barstow woolly sunflower	Federal: None State: None CNPS: 1B.2	March – May Prefer gravelly soils in scrub habitat and playas; populations on Edwards AFB are limited to the edges of bare areas in saltbush scrub	Present
<i>Eschscholzia minutiflora</i> ssp. <i>twisselmannii</i> Red rock poppy	Federal: None State: None CNPS: 1B.2	March – May Rare in Mojave desert scrub habitats adjacent to the Rand and El Paso Mountains; one record on Edwards AFB to the west of Rogers Dry Lake	High
<i>Goodmania luteola</i> Yellow spiny cape* (Golden goodmania)	Federal: None State: None CNPS: 4.2	April – August Prefers alkaline or clay soils within Mojave desert scrub, meadow sand seeps, playas, and grasslands; limited to salt-encrusted, rolling sandy areas southwest of Rogers Dry Lake	High
<i>Loeflingia squarrosa</i> var. <i>artemisiarum</i> Sagebrush loeflingia	Federal: None State: None CNPS: 2.2	April – May Dunes in saltbush scrub; on Edwards AFB in several locations	High
<i>Muilla coronata</i> Crowned onion	Federal: None State: None CNPS: 4.2	March – April Known to occur in northeast section of Edwards AFB and in the Kramer Junction area	Present
<i>Nemacladus gracillis</i> Slender threadplant	Federal: None State: None CNPS: 4.3	March – May Known to occur in northeast section of Edwards AFB, including the Leuhman Ridge area	Present
<i>Senna covesii</i> Coves' cassia	Federal: None State: None CNPS: 2B.2	May - June Sandy soil and gravelly washes; open playas/claypan; one record on Edwards AFB to the northwest of Roger's Dry Lake	Moderate

Sources: Edwards AFB, 2015; CNPS, 2015

Notes: *Species is not shown on Figure 3-8 since locations have not been reported to the California Natural Diversity Database (CNDDB). However, the INRMP indicates it has been found on Base (Edwards AFB, 2015).

CNPS Status:

List 1A Plants presumed extinct in California.

List 1B Plants rare, threatened, or endangered in California and elsewhere.

List 2 Plants rare, threatened, or endangered in California but more common elsewhere.

List 3 Plants about which more information is needed, a review list.

List 4 Plants of limited distribution, a watch list.

CNPS includes a decimal threat ranking with the List ranks to parallel the nomenclature used by the CNDDB. This extension replaces the E (Endangerment) value from the R-E-D Code. CNPS ranks therefore read like this: 1B.1, 1B.2, etc.

New Threat Code extensions and their meanings:

- .1 – Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
- .2 – Fairly endangered in California (20-80% occurrences threatened)
- .3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

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Note that all List 1A (presumed extinct in California) and some List 3 plants lacking any threat information receive no threat code extension. Also, these Threat Code guidelines represent a starting point in the assessment of threat level. Other factors, such as habitat vulnerability and specificity, distribution, and condition of occurrences, are also considered in setting the Threat Code.

Each species with a potential to occur of moderate, high or present are discussed in further detail below. Those of low potential for occurrence are not discussed further.

Lancaster milkvetch is a perennial herb that belongs to the fabaceae (legume) family. Lancaster milkvetch prefers areas of high water table in saltbush scrub. Very few populations have been recorded in California. The most extensive populations occur in southern Nevada. It occurs in lowlands south of Rogers Dry Lakebed on Edwards AFB, which is in proximity to Corridor 1.

Alkali mariposa lily is a perennial bulbiferous herb belonging to the liliaceae (lily) family, which can be found between elevations of approximately 2,600 and 4,600 feet above mean sea level (MSL) (800 to 1,400 meters above MSL). Alkali mariposa lily is native to California and Nevada. It occurs primarily in claypans and sand dunes in halophytic saltbush scrub. The alkali mariposa lily occurs in the western section of Edwards AFB, and has been mapped along Corridors 1 and 3, and near Corridors 2, 5, 6 and 9.

White pygmy poppy is an annual herb belonging to the papaveraceae (poppy) family which can be found between elevations of approximately 1,968 and 4,790 feet above MSL (600 and 1,460 meters above MSL). The white pygmy poppy is widespread in sandy soils of the western Mojave Desert. It prefers to grow in Joshua tree woodlands and scrub. On Edwards AFB, it has been mapped in proximity to Corridors 2 and 6.

Mojave spineflower is an annual herb belonging to the polygonaceae (buckwheat) family and is found between elevations of approximately 20 and 4,300 feet above MSL (6 to 1,300 meters above MSL). The Mojave spineflower occurs primarily in bare areas in the saltbush scrubs of the Antelope Valley. It does well in disturbed soils and will grow in utility corridors and abandoned roads in saltbush scrub habitat. It occurs primarily southwest of Rogers Dry Lake in a similar habitat preferred by the Barstow woolly sunflower. On Edwards AFB it has been found near Corridor 1.

Desert cymopterus is a perennial herb belonging to the apiaceae (parsley) family and is found between elevations of approximately 2,100 and 5,000 feet above MSL (630 to 1,500 meters above MSL). Desert cymopterus is endemic to the western and central Mojave Desert in California. Desert cymopterus is a perennial with a long tap root on a caudex. Population boundaries for this species on Edwards AFB have been expanded as more intensive surveys were completed, but few new populations have been found. The plant is associated with Joshua tree woodland because plant diversity in general increases in sandy sites. There are 54 documented populations of desert cymopterus on Edwards AFB. This species often occurs in microtopography of swales in sand fields or where very weak drainages intersect. Desert cymopterus has rarely been observed in heavy or rocky soils at the base of hillsides. It has been mapped along Corridor 5 and near Corridors 1 and 4.

Recurved larkspur is a perennial herb that belongs to the ranunculaceae family that is found between elevations of approximately 59 and 2,034 feet above MSL (18 to 620 meters above MSL). Recurved larkspur prefer shadescale scrub, valley grassland and foothill woodland. They can occasionally be found in wetlands. Recurved larkspur have been observed on Edwards AFB, including one siting along Corridor 5.

Rosamond eriastrum is an annual herb similar to Hoover's woollystar that belongs to the phlox family and is found between elevations of approximately 2,297 and 2,345 feet above MSL (700 to 715 meters above MSL). This species prefers alkaline hummocks and vernal pool edges. It is known only to occur at the Rogers Dry Lake and Rosamond Dry Lake areas on Edwards AFB. It has been mapped along Corridor 3 and near Corridor 2.

Barstow woolly sunflower is a perennial herb belonging to the asteraceae (sunflower) family and is found between elevations of approximately 1,650 and 3,150 feet above MSL (500 to 960 meters above MSL). All populations on Edwards AFB are limited to the edges of bare areas in saltbush scrub. The Barstow woolly sunflower is one of several species of woolly daisies occurring on Edwards AFB. It is the smallest and most compact. A total of 47 populations are located on Edwards AFB, and it has been mapped along Corridors 4 and 5 and near Corridors 1, 2 and 6.

Red rock poppy is an annual herb belonging to the poppy family and is found between elevations of approximately 2,230 and 4,035 feet above MSL (680 to 1,230 meters above MSL). It is rare and occurs in scrub adjacent to the Rand and El Paso Mountains. One location of red rock poppy has been recorded on Edwards AFB adjacent to Corridors 1 and 6.

Yellow spiny cape is an annual herb that belongs to the buckwheat family and is found between elevations of approximately 66 and 7,218 feet above MSL (20 to 2,200 meters above MSL). Yellow spiny cape is found on alkaline or clay soils. It occurs in Edwards AFB on salt-encrusted, rolling sandy areas southwest on Rogers Dry Lake. This location is in proximity to Corridor 1.

Sagebrush loeflingia is an annual herb that that belongs to the caryophyllaceae (carnation) family and is found between elevations of approximately 2,297 and 5,299 feet above MSL (700 to 1,615 meters above MSL) Sagebrush loeflingia is found in sand dunes in halophytic saltbush scrub. On Edwards AFB, it is found in general area around Rogers Dry Lake. This species has been found near Corridors 1, 2, 3, 4 and 5.

Crowned onion is a perennial herb that belongs to the themidaceae family. It can be found between the elevations of approximately 1,640 and 6,759 feet above MSL (500 to 2060 meters above MSL). Crowned onion grows in sandy loam soil and prefers creosote bush scrub, Joshua Tree and Pinyon-Juniper woodlands. There is one record of this species on Edwards AFB to the northwest of US-395 near the Kramer Junction area, near Corridor 4.

Slender threadplant is an annual herb that belongs to the campanulaceae family. It can be found between the elevations of approximately 1,411 and 6,037 feet above MSL (430 to 1840 meters above MSL). Slender threadplant prefers rocky slopes, sandy washes and dunes. It has been found near Rich Road and in the Leuhman Ridge area of Edwards AFB. This species has been sighted on Edwards AFB to the south of State Route 58, near Corridor 5.

Coves' cassia is a perennial herb that belongs to the legume family. It can be found between the elevations of approximately 935 – 3,510 feet above MSL (285 – 1,070 meters above MSL). Coves' cassia grows in sandy and gravelly soils on open mesas, slopes, claypans, and playas.

There is one record of this species on Edwards AFB to the northwest of Roger's Dry Lake, near Corridor 5.

Sensitive Wildlife Species

Birds

Many species of sensitive birds recorded at Edwards AFB migrate through the installation but do not nest or linger in the area and are also unlikely to be found near the proposed utility corridor locations. The remaining bird species are addressed in Table 3-9, along with all sensitive reptile and mammal species previously identified through exhaustive surveys conducted on Edwards AFB over the past several decades. These birds may inhabit the Base, primarily during migration. They include peregrine falcon (*Falco peregrinus*), Swainson's hawk (*Buteo swainsoni*), bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*). Other bird special status species that have been observed on Base include the tricolored blackbird (*Agelaius tricolor*), short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), western snowy plover (*Charadrius alexandrinus*), mountain plover (*Charadrius montanus*), northern harrier (*Circus cyaneus*), prairie falcon (*Falco mexicanus*), loggerhead shrike (*Lanius ludovicianus*), LeConte's thrasher (*Toxostoma lecontei*), and burrowing owl.

Reptiles

Two species of state or federal reptile of special interest occur on Edwards AFB with a likelihood of occurring within the utility corridors. They include the Western pond turtle and the desert tortoise.

Mammals

The only federal or state threatened mammal that occurs on Edwards AFB is the Mohave ground squirrel, which is a California threatened species. California species of special concern (SSC) that occur on Edwards AFB include the pallid bat (*Antrozous pallidus*), Townsend's western big-eared bat (*Corynorhinus townsendii*), California mastiff bat (*Eumops perotis californicus*), big free-tailed bat (*Nyctinomops macrotis*), and American badger.

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Table 3-9 Special-Status Species Potential for Occurrence - Wildlife

Scientific Name Common Name	Status	Habitat	Potential for Occurrence
Reptiles			
<i>Emys marmorata</i> Western pond turtle	Federal: BLM Sensitive State: None	Throughout California, including areas of the Mojave Desert that have permanent or nearly permanent water sources	Present
<i>Gopherus agassizii</i> Desert tortoise	Federal: Threatened State: Threatened Local: None	Desert scrubs and wash vegetation with friable soils	Present
Birds			
<i>Agelaius tricolor</i> Tricolored blackbird	Federal: BCC; State: BLM Sensitive Endangered; Local: None	Central Valley of California and its vicinity and foothills; observed nesting on Base at Piute Ponds and Branch Memorial Park Pond	Nesting high; Foraging high
<i>Aquila chrysaetos</i> Golden eagle*	Federal: Bald and Golden Eagle Protection Act; BCC State: BLM Sensitive Fully protected Local: WEMO covered species	Migratory on Base; may nest on cliff faces; foraging on Base in winter	Nesting low, foraging high
<i>Artemisiospiza belli belli</i> Bell's sparrow	Federal: BCC State: None	California coast ranges; has been sighted in Jawbone Canyon, Kern County; found in sagebrush, saltbush and other low shrub habitats	Present
<i>Asio flammeus</i> Short-eared owl	Federal: None State: SSC Local: WEMO Covered Species	Marshes and seasonal wetlands; WEMO states that they appear to nest on Edwards AFB at Piute ponds	Nesting high, foraging high
<i>Asio otus</i> Long-eared owl*	Federal: None State: SSC Local: WEMO Covered Species	Nesting in large trees; foraging in most habitats; on Base in wooded areas such as woodlands near Haystack Butte and Mesquite woodlands; observed at the South Base evaporation ponds	Nesting high, foraging high
<i>Athene cunicularia</i> Burrowing owl	Federal: BCC; State: BLM Sensitive SSC	Nesting in burrows in the ground or open holes, pipes, etc.; foraging in most open habitats; has been observed on Base previously	Burrowing high, foraging high

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Scientific Name Common Name	Status	Habitat	Potential for Occurrence
<i>Aythya Americana</i> Redhead	Federal: None State: SSC	Found throughout California, including the Central Valley and Eastern Kern County; nests primarily in wetland areas bordering open water	Present
<i>Buteo swainsoni</i> Swainson's hawk	Federal: None State: Threatened	Has been known to breed in the Antelope Valley; nests in large trees or utility poles	Present
<i>Charadrius alexandrinus</i> Western snowy plover (interior population)	Federal: None State: SSC Local: WEMO Covered Species	Nest on certain playas and wetlands in the Western Mohave; one record on Edwards AFB at Rosamond Dry Lake bed	Nesting moderate, foraging moderate
<i>Charadrius montanus</i> Mountain plover	Federal: BCC; State: BLM Sensitive Local: SSC WEMO Covered Species	Occasionally observed along edges of ponds and playas on Edwards AFB	Nesting high Foraging high
<i>Circus cyaneus</i> Northern harrier*	Federal: None State: None Local: WEMO Covered Species	May forage in all habitat zones; common in aquatic habitats; nest at Piute Ponds on Base	Nesting high, foraging moderate
<i>Empidonax traillii</i> Willow flycatcher	Federal: BLM Sensitive; State: BCC Local: None	Occurs throughout California during breeding season; nests in shrubs; feeds on insects and some berries	Present
<i>Falco mexicanus</i> Prairie falcon*	Federal: BCC State: None Local: WEMO Covered Species	Nesting on cliff faces; has been observed hunting throughout Edwards AFB, including portions of the cantonment area	Nesting moderate, foraging high
<i>Falco peregrinus anatum</i> Peregrine falcon	Federal: BCC State: None	Nests on high cliffs, banks, dunes and mounds; primarily hunts birds	Nesting moderate, foraging high
<i>Lanius ludovicianus</i> Loggerhead shrike*	Federal: BCC State: SSC	Nesting in dense desert shrubs and cactus; foraging in same areas; occur throughout Edwards AFB and the Mojave Desert	Nesting high, foraging high
<i>Riparia riparia</i> Bank swallow	Federal: None State: Threatened	Nesting on cliff faces; commonly found foraging for insects over grasslands	Present
<i>Sterna antillarum browni</i> California least tern	Federal: Endangered State: None	Common in aquatic habitats; feeds upon fish; nests near water	Present
<i>Toxostoma lecontei</i> LeConte's thrasher	Federal: BCC State: SSC Local: WEMO Covered Species	Occurs in Joshua tree woodland, saltbush scrub and creosote bush scrub; associated with washes Basewide	Nesting high, foraging high

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Scientific Name Common Name	Status	Habitat	Potential for Occurrence
<i>Xanthocephalus xanthocephalus</i> Yellow-headed blackbird	Federal: None State: SSC	Nests along aquatic areas dense with vegetation; found year-round in the Central Valley	Present
Mammals			
<i>Antrozous pallidus</i> Pallid bat*	Federal: BLM Sensitive State: SSC Local: WEMO Covered Species	Roosts in caves and human developments such as mines and large buildings; forages on the ground	Moderate
<i>Corynorhinus townsendii</i> Townsend's western big-eared bat*	Federal: BLM Sensitive State: Candidate Threatened; SSC Local: WEMO Covered Species	Roosts in caves and human developments such as mines and large buildings	Moderate
<i>Eumops perotis californicus</i> California mastiff bat*	Federal: BLM Sensitive State: SSC	Roosts in cliffs and rock crevices	Moderate
<i>Nyctinomops macrotis</i> Big free-tailed bat*	Federal: None State: SSC	Roosts in rock crevices and on cliffs	Moderate
<i>Onychomys torridus</i> Southern grasshopper mouse	Federal: None State: SSC	Commonly found in the Mojave Desert and Central Valley; habitats include alkali desert scrub and desert scrub	Present
<i>Perognathus longimembris</i> Little pocket mouse	Federal: None State: SSC	Year-round resident of southern California deserts, including Kern County; habitats include desert scrub, desert wash, and sagebrush	Present
<i>Taxidea taxus</i> American badger*	Federal: None State: SSC	Open dry habitats with variable soils and rodents for prey; uncommon but has been found throughout Edwards AFB; entire Base is potential habitat	Moderate
<i>Xerospermophilus mohavensis</i> Mohave ground squirrel	Federal: BLM Sensitive State: Threatened	Most desert habitats with sandy or gravelly soils, found throughout Edwards AFB	Present

Source: Edwards AFB, 2015; CDFW, 2015

* Species is not shown on Figure 3-8 since locations have not been reported to the CNDDDB. However, the INRMP indicates it has been found on Base (Edwards AFB, 2015).

Species Status:

BCC: Listed by USFWS as a bird of conservation concern

BLM Sensitive: Species listed as sensitive by the U.S. Bureau of Land Management

SSC: California state species of special concern

WEMO covered species: A species that is covered in the Western Mojave Plan

Each species with a potential to occur of moderate or high, or known to be present is discussed in further detail below. Those of low potential for occurrence are not discussed further.

Western pond turtle is a BLM-sensitive species and has been petitioned to be federally listed by USFWS. They are found throughout California aquatic habitat, including in the Mojave River located in the Mojave Desert. They prefer habitats with permanent or nearly permanent water. Western pond turtles like to bask on partially submerged items, such as rocks, logs, and floating vegetation. They are active year-round, but will hibernate during cold weather. They are most active from April to July. The western pond turtle has been observed in the Piute Ponds area and could occur within proposed Corridor 3.

Desert Tortoises are listed as threatened under both the federal and state Endangered Species Acts. It is the only species which resides on Edwards AFB that is listed as threatened under the Federal Endangered Species Act (ESA). Surveys for desert tortoise indicate the species occurs throughout the Base. However, the level of density varies, with the highest densities in the southcentral and southeastern areas. Figure 3-8 provides a map of the probability of encountering a desert tortoise, or the sign of a desert tortoise, on Edwards AFB. The southwestern and northwestern corners of the installation and the Main Base area contain the lowest density levels. Tortoises are absent from the lakebeds, including Rosamond Dry Lake. Desert tortoise habitat occurs along all of the proposed corridors and desert tortoise critical habitat occurs along Corridors 4 and 5.

Tricolored blackbirds are listed as a BCC species, a BLM sensitive species, has been emergency listed as endangered by the CDFW. They occur in a variety of habitats in California near water sources in the Central Valley and vicinity, but also occurs in the foothills surrounding the valley. Tricolored blackbirds occur in low abundances in southern and coastal California and sporadically in Oregon, northwestern Baja California and western Nevada. On Edwards AFB, tricolored blackbirds have been observed nesting at Piute Ponds and Branch Memorial Park Pond, but could occur at any pond with reeds such as the one on the Edwards AFB golf course. Potential habitats occur along Corridor 3.

Golden eagles are protected under the federal Bald and Golden Eagle Protection Act and inhabit a wide range of habitats ranging from arctic to desert. Urbanization and human-population growth have made areas historically used by eagles unsuitable, particularly in southern California. Extensive agricultural development reduces jackrabbit populations and makes areas less suitable for nesting and wintering eagles. Recreation and other human activity near nests can cause breeding failures. Golden eagle habitat could occur within all proposed corridors.

Bell's sparrows are listed as a BCC covered species. They are found in sagebrush, saltbush and other low shrub habitats. They range from the California Coast Ranges and Western Sierra Nevada to Baja California. They are active during the day, feeding on seeds. They could occur within all proposed corridors.

Short-eared owls are a California SSC and a WEMO covered species. Their preferred habitat is marshes and seasonal wetlands. The WEMO states that short-eared owls appear to nest on Edwards AFB at Piute Ponds, which are to the east of Corridor 3.

Long-eared owls are a WEMO covered species found throughout North America; they nest in trees, cavities, cliffs and occasionally on the ground, but hunt in open habitats. Long-eared owls have been recorded in wooded areas such as woodlands near Haystack Butte and Mesquite woodlands. They have also been observed at the South Base evaporation ponds, which are east of Corridor 3.

Burrowing owls are listed as a BCC, as a BLM sensitive species, and as a California SSC. They are small ground-dwelling owls that live in modified rodent holes and have been observed throughout Edwards AFB. They live primarily in dry, open scrub or grassland, are active day and night and frequently nest in loose colonies. Burrowing owls feed on a wide variety of prey, including small mammals, especially mice and rats, reptiles and amphibians, scorpions, bats and small birds. Burrowing owls have been previously found within and adjacent to Corridors 1, 2, 3 and 5 and could occur within or near all of the corridors.

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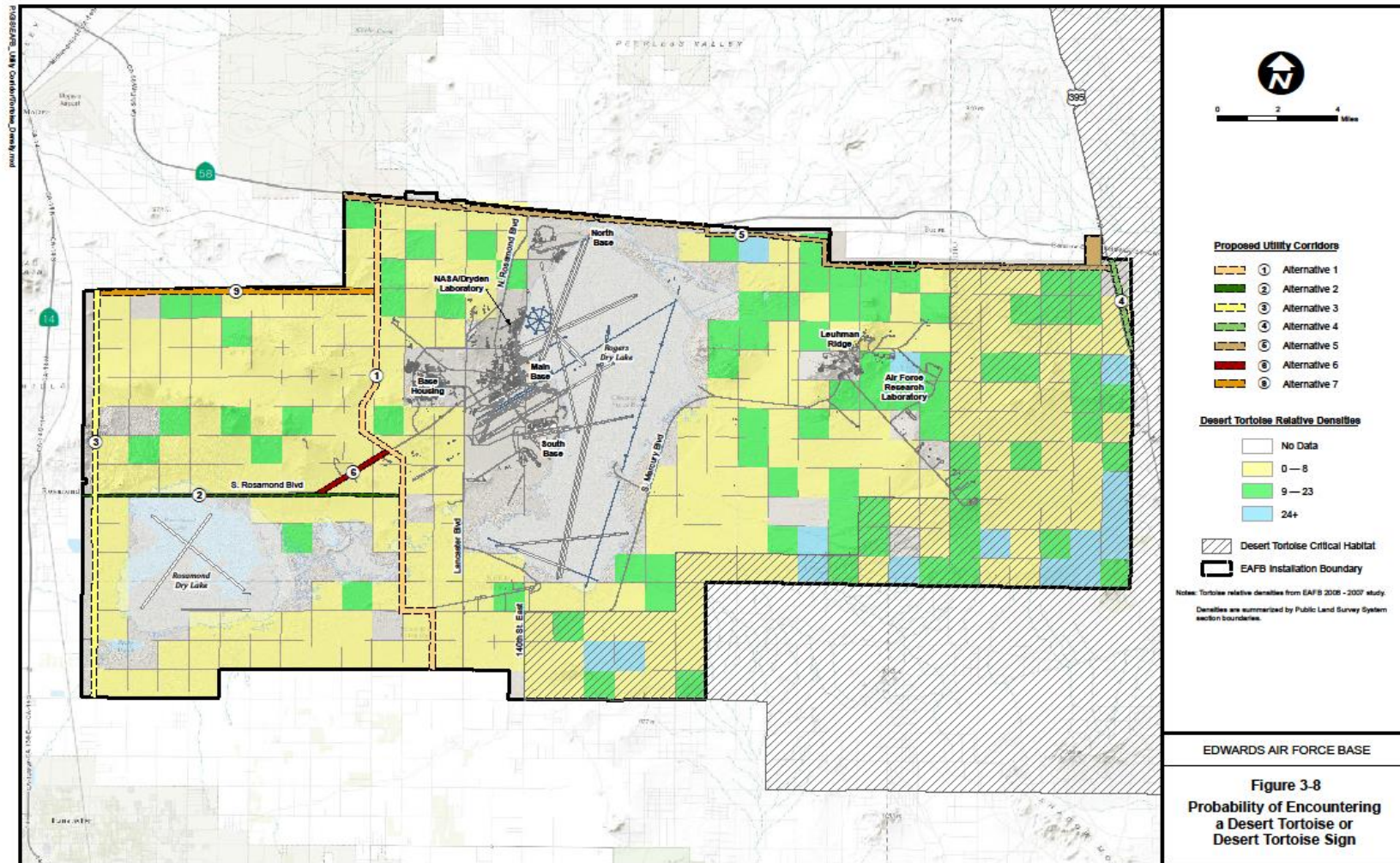


Figure 3-8 Probability of Encountering a Desert Tortoise or Desert Tortoise Sign

Redheads are a California SSC listed species. They prefer wetland areas that border open water. Redhead's breed primarily in northeastern California; but small numbers are also known to breed in the Central Valley and eastern Kern County. They are active day and night feeding mostly on leaves, stems and tubers. On Edwards AFB, they have been observed in the Piute Ponds and Branch Park areas. Redheads could occur within proposed Corridors 1 and 3.

Swainson's hawks are listed as threatened under the state Endangered Species Act. In California, they are primarily found in the Central Valley, but have been known to breed in the Antelope Valley. They eat small rodents, amphibians and other birds. They live primarily in open desert or grassland and are active during the day. They could occur within all proposed corridors.

Western snowy plovers (interior population) are a California SSC and a WEMO listed species. They nest on playas and wetlands in the Western Mojave. On Edwards AFB there is a record of western snowy plovers at Rosamond Dry Lake Bed, which is adjacent to Corridor 3 and near Corridor 2.

Mountain plovers are a BLM sensitive species, a California SSC, and a WEMO covered species. Mountain plovers move into the southern deserts and California central valley for winter where they are found almost exclusively in agricultural fields. On Edwards AFB, mountain plovers have been observed near Corridors 1 and 3.

Northern harriers are a California SSC. Northern harriers can be found throughout the West Mojave in winter. Nesting is limited to locations with year-round marsh habitat. They nest on Edwards AFB at Piute Ponds, adjacent to Corridor 3, and have been observed foraging throughout the Base.

Willow flycatchers are listed as a BCC, as a BLM sensitive species. They are found nationwide, including throughout California during the breeding season. Their habitat includes shrubs and willow thickets. Their diet consists mainly of insects, but they have been known to

eat some berries. On Edwards AFB, they have been observed in the Piute Ponds and Branch Park areas. They could occur within proposed Corridors 1 and 3.

Prairie falcons are listed as a BCC and are a WEMO covered species. They are permanent residents in California within habitats that support open, dry, level or hilly terrain. They breed on cliffs and forage extremely large distances. Prairie falcons are an efficient and specialized predator of medium-sized desert mammals and birds. They seem to persist despite agricultural development, livestock-grazing, energy development, off-road vehicle use and military training. They could occur within all proposed corridors.

Peregrine falcons are listed as a BCC covered species. They can be found nationwide, including the coast and mountain areas of northern California. During the winter season, they migrate inland to Central Valley, California. They prey upon other birds, but have been known to occasionally prey upon small mammals, insects and fish. They could occur within all proposed corridors.

Loggerhead shrikes are listed as a BCC and a California SSC. They are small predatory birds that occur throughout Edwards AFB and the Mojave Desert. It is a resident in most of California, particularly roadsides, grasslands, agricultural fields, golf courses, and riparian areas. The bird is often seen perching on Joshua trees on Edwards AFB. Its primary food includes lizards, small rodents, large insects, amphibians, road-killed animals and carrion. They could occur within all proposed corridors.

Bank swallows are listed as threatened under the state Endangered Species Act. They are permanent residents of California, especially in lowland areas. A majority of the breeding population lives in the northern Central Valley. Nests are built in vertical banks and cliffs and require sandy soils. They have been observed nesting in the Piute Ponds area, but can be found foraging in brushland, grassland, wetlands and croplands. They could occur within all proposed corridors.

California least terns are listed as endangered under the federal Endangered Species Act. They feed in aquatic areas that are abundant with fish. Nests are close to water usually in open areas.

They are active during the day. On Edwards AFB, they have been observed in the Piute Ponds, Branch Park and dry lakebed areas. They could occur within proposed Corridors 1, 2, 3 and 5.

LeConte's thrashers are listed as a BCC, a California SSC, and as a WEMO listed species. They are endemic to the Mojave and Sonoran Deserts and are found throughout Edwards AFB in Joshua tree woodland, saltbush scrub and dense creosote bush scrub. This species requires an undisturbed soil surface under desert shrubs. Agriculture and urban development have eliminated much of its habitat. They feed on any ground-dwelling insect, small reptiles and some seeds. They could occur within all proposed corridors.

Yellow-headed blackbirds are a California SSC listed species. They are found throughout California, but are located year-round in the Central Valley area. They mainly eat seeds and grains, but also eat insects. Nests are located in dense vegetation near deep water. They are active during the day. On Edwards AFB, they have been observed in the Piute Ponds and Mesquite Woodland areas. They could occur within proposed Corridors 1 and 3.

Pallid bats are listed as a BLM sensitive species, a California SSC, and as a WEMO Covered Species that occurs across much of western North America, along the coast from Mexico to Canada. Pallid bats are most likely migratory, although occasional individuals have been reported in the U.S. during the winter. They could occur within all proposed corridors.

Townsend's western big-eared bats are listed as a BLM sensitive species, a California SSC, and a WEMO covered species. They are also a California candidate threatened species. Townsend's western big-eared bats feed entirely on moths. Townsend's big-eared bats hibernate in tight clusters throughout their range during winter months. They could occur within all proposed corridors.

California Mastiff bats are a BLM sensitive species and a California state species of special concern. They are the largest North American bat and range from southern California and Arizona, south into Mexico. They could occur within all proposed corridors.

Big free-tailed bats are a California SSC. This species probably does not breed in California, but are residents. Big free-tailed bats frequents rocky or canyon areas where they roost in crevices. They could occur within all proposed corridors.

Southern grasshopper mouse is a California SSC. It is found in desert habitats, including the Mojave Desert and southern Central Valley. Feeds on scorpions, grasshoppers, crickets and other invertebrates. Uses nests that have been abandoned by other rodents. They are active at night. They could occur within all proposed corridors.

Little pocket mouse is a California SSC. It is found in desert habitats, including those in Kern County. They are active at night. They become inactive aboveground between fall and spring, staying underground to avoid cold temperatures. They could occur within all proposed corridors.

American badgers are listed as a California SSC. They are a widespread but uncommon burrowing animal throughout their range. Their primary prey is rodents and they commonly avoid people and urban or developed areas. Although they are an uncommon species, American badgers have been observed on Edwards AFB and the whole Base is potential habitat. They could occur in all proposed corridors.

Mohave ground squirrels are listed under the CESA as threatened. They are small ground squirrels that are active only during the spring and early summer, staying underground the remainder of the year to avoid periods of extreme heat and cold. Mohave ground squirrels have been found throughout Edwards AFB. This species has been found in or near Corridors 1, 2, 3, 4, 5 and 6 and all corridors could support Mohave ground squirrel (Figure 3-9).

Sensitive Habitats

The Fremont-Kramer desert tortoise critical habitat unit (a USFWS designation) and Desert Wildlife Management Area (DWMA, a BLM designation) were created for the protection of the federally- and state-threatened desert tortoise and overlap portions of the eastern area of Edwards AFB (Figure 3-10). The portion of the critical habitat for desert tortoise on Base consists of approximately 60,800 acres primarily located on the PIRA and the AFRL. Approximately 345

acres of critical habitat occur within Corridor 4 and 585 acres of critical habitat occur within Corridor 5.

The Mohave Ground Squirrel Conservation Area was developed through the West Mojave Plan (U.S. Department of the Interior, Bureau of Land Management, 2005), is located on non-military lands adjacent to Edwards AFB and is managed by the BLM for the protection of habitat for this state-threatened species. None of the utility corridors crosses this conservation area.

The Piute Ponds Complex, located in the southwestern corner of Edwards AFB, is bounded by the western base boundary, Avenue E to the south, and 50th Street East to the east. It contains the largest body of perennial surface water on Edwards AFB and is the largest freshwater marsh in Los Angeles County. The Piute Ponds Complex consists of lower Amargosa Creek, ponds, marshes, wetland meadows, low sand dunes, small clay pans and Rosamond Dry Lake. The upland and wetland area (excluding Rosamond Dry Lake) of the Piute Ponds Complex encompasses approximately 5,614 acres (Figure 3-11). Of the 5,614 acres, approximately 1,410 acres of ponds, wetlands, wet meadows and clay pans are in an area where the water flow/levels can be managed. These areas are subject to flow from Sanitation District 14 (D14) Lancaster Wastewater Treatment Plant, and depending on the area, are perennially or seasonally flooded. This is considered the Water Management Area (WMA). Other seasonally flooded wetlands exist outside of this WMA and receive water from natural ephemeral surface water as it flows to the lakebed. Other seasonally flooded wetlands exist around the active WMA and are fed from natural ephemeral surface/storm water as it flows to the lakebed. The Rosamond Dry Lake portion of the Piute Ponds Complex is approximately 13,800 acres (Edwards Air Force Base, 2015). The southern portion of Corridor 3 traverses the western piece of the Piute Ponds Complex.

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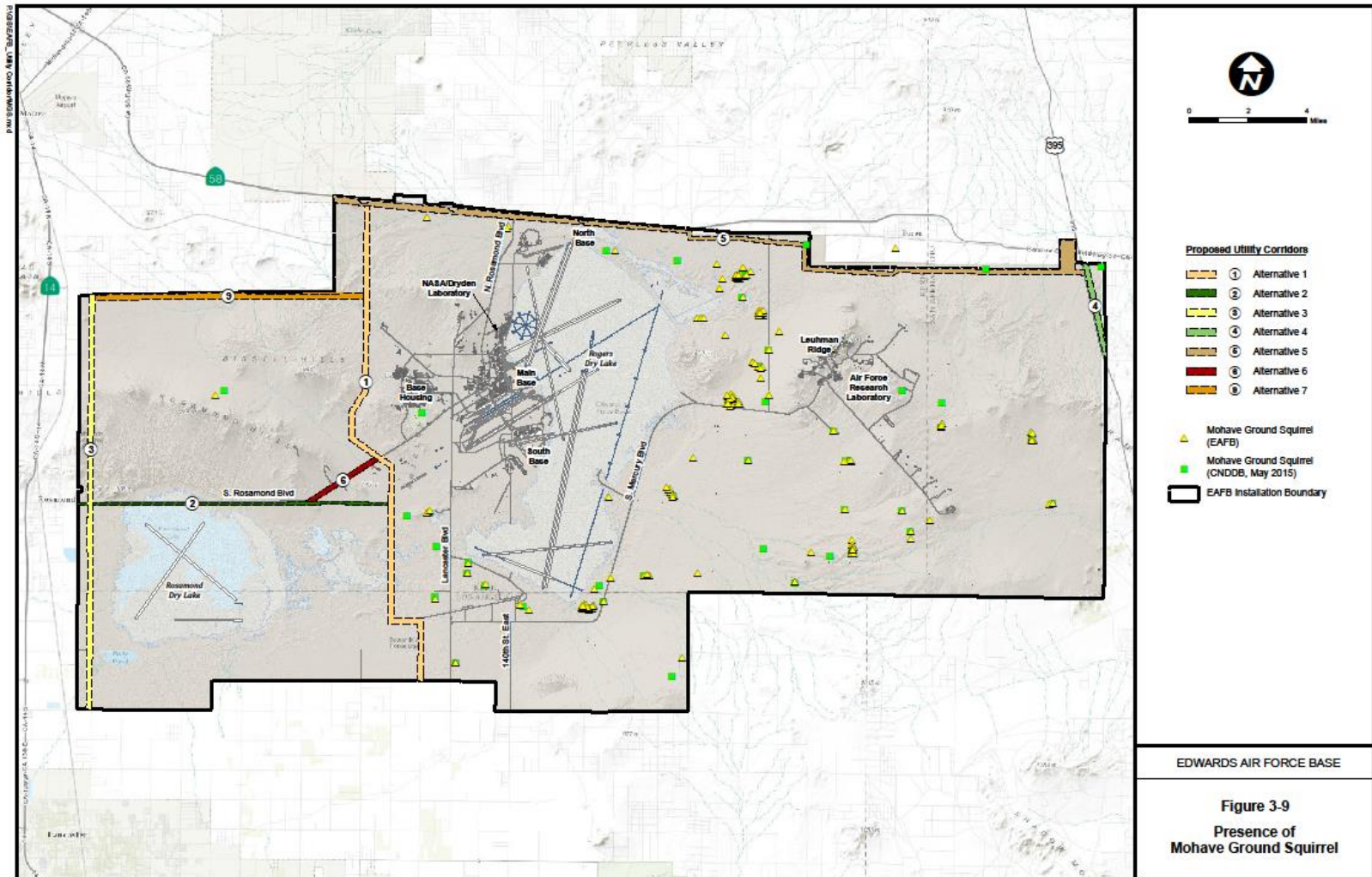


Figure 3-9 Presence of Mohave Ground Squirrel

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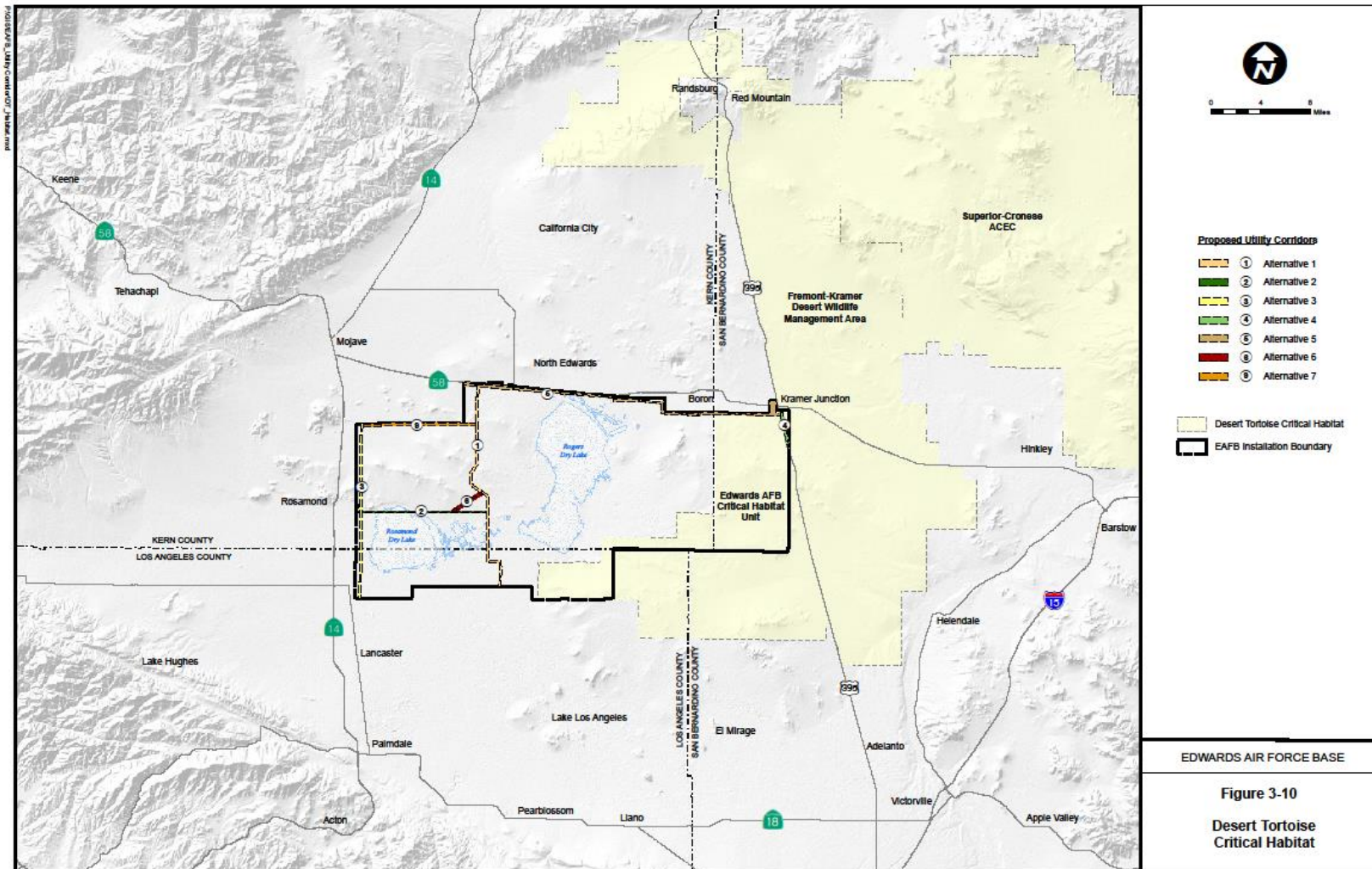


Figure 3-10 Desert Tortoise Critical Habitat

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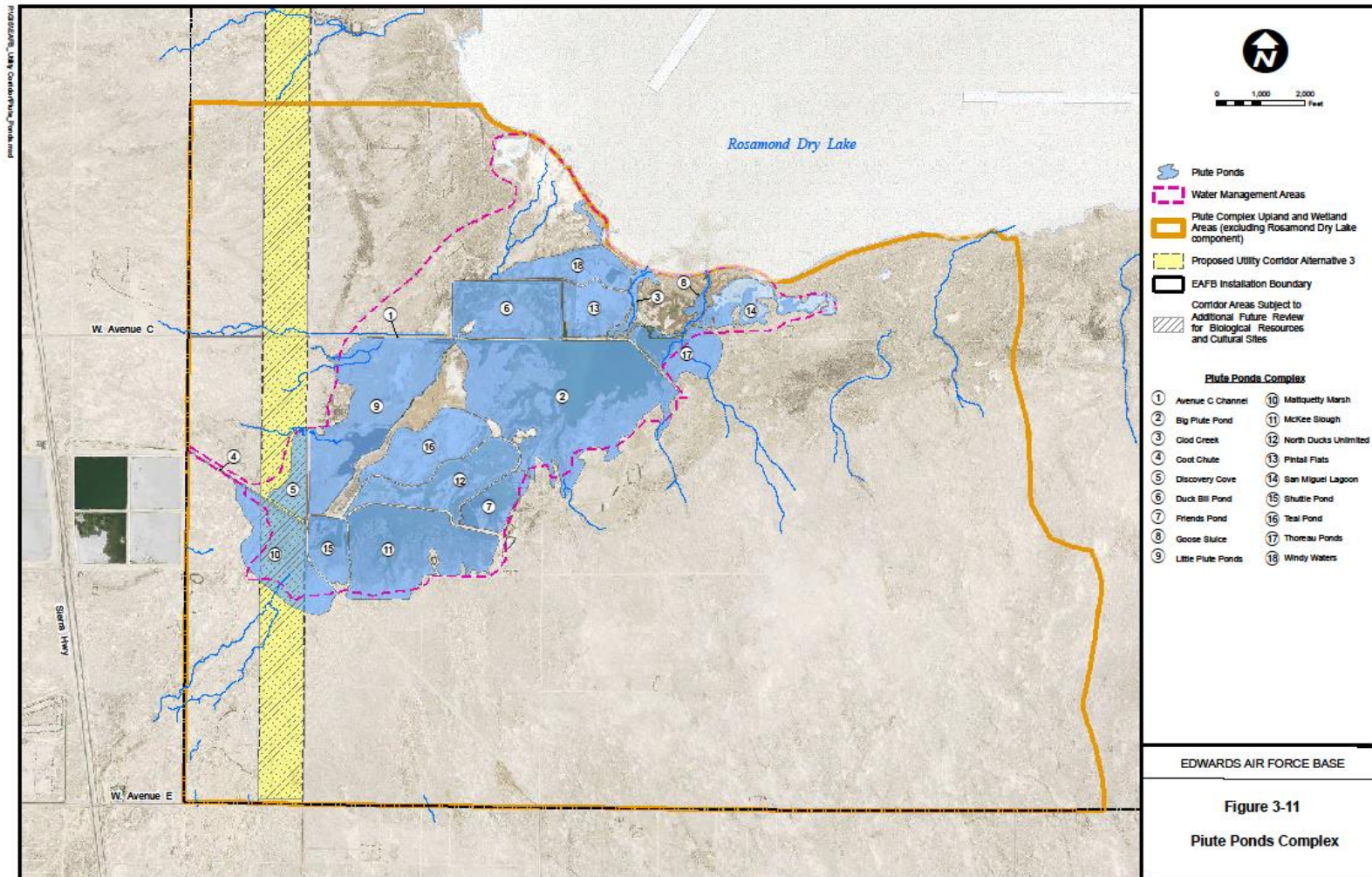


Figure 3-11 Piute Ponds Complex

3.8 NOISE

3.8.1 Overview

The major sources of noise at Edwards AFB are vehicle traffic on streets from staff, contractors and vendors traveling to and from the Base and aircraft operations, including air traffic and engine testing. Motor vehicle noise at Edwards AFB originates mainly at Lancaster Boulevard, Rosamond Boulevard and primary and secondary streets on Base.

The methodology for describing the statistical characteristics of community noise-level fluctuations is the percent of exceedance. For example, if the noise level during a certain time period exceeds 65 decibels on the A-weighted scale (dBA) for 25 percent of the time (e.g., 15 minutes out of 1 hour), the exceedance for 65 dBA is said to be 25 percent. Noise exceedance levels are denoted by L_{10} , L_{50} , L_{90} and so on, where the subscript represents the percent of the time that the noise level is exceeded. Additionally, environmental noise can be characterized by average levels such as the energy equivalent continuous noise levels (L_{eq}), which can be averaged over a 24-hour period or, for specific applications, it can be averaged over a portion of the day. The daytime noise level (L_d) refers to noise between 7 a.m. and 7 p.m. The day/night equivalent A-weighted noise level (L_{dn} or DNL) incorporates a 10-decibel (dB) penalty for nighttime noise between 10 p.m. and 7 a.m. to reflect the added likelihood of annoyance during this period. DNL is the standard federal metric for determining cumulative exposure of individuals to noise. DNL is the 24-hour average A-weighted dB sound level measure of noise.

Background noise monitoring conducted at Edwards AFB in May of 1993 (GRW Engineers and Tetra Tech, 1994), showed L_{dn} noise levels ranging as follows:

- From 37 dB to 68 dB at the housing area and vicinity where the maximum value (68 dB) occurred behind the hospital and resulted mainly from a continuous noise from an air conditioning system on the roof of the hospital;
- From 57 to 65 dB on North Base locations where the maximum value (65 dB) resulted from an air conditioning system on the roof of the Hazardous Waste Laboratory;

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- From 69 to 76 dB in the Main Base where primary sources were aircraft operation near the facilities where noise monitoring was conducted;
- From 61 to 72 dB at the South Base where the maximum value (72 dB) was associated with aircraft operations (i.e., landings and takeoffs) at the runway;
- Noise levels at the Philips Laboratory area ranged from 46 dB to 55 dB where the maximum value (53 dB) originated from motor vehicles traveling on a near roadway.

The Community Noise Equivalent Level (CNEL) has been adopted by the state of California as the descriptor for measuring noise levels. The state recommends 60 CNEL as an acceptable level of exterior noise for residential uses, and the Air Force instruction for Air Installation Compatible Use Zone (AICUZ) directs installations in California to show those contours on their AICUZ maps. The decibel is the commonly accepted unit used to measure sound. The CNEL represents the average sound level during a 24-hour day with the addition of a 5 dB penalty for evening noise (7:00 p.m. to 10:00 p.m.) and a 10 dB penalty for nighttime noise (10:00 p.m. to 7:00 a.m.). An aircraft noise study conducted in February 2010 for Edwards AFB to provide detailed analysis of potential noise effects related to current and projected base operations showed a CNEL range of 60 dB to 85 dB. The noise sources included in the study were airfield flight operations, range air operations by aircraft, range land-based operations, supersonic air operations, and single event sonic booms. The study produced a noise map for Edwards AFB showing that all noise contours, CNEL 60 dB to CNEL 85dB, are contained within the Edwards AFB Base boundaries (Edwards AFB, 2013).

3.8.2 Noise Setting for Each Corridor

Noise associated with the Proposed Action would primarily result from on- and off-road motor vehicles and construction equipment used during land clearing, grading, excavating and trenching necessary for installation of underground utilities. The majority of the area covered by the Proposed Action Alternatives is separated from sensitive receptors. The Alternatives with the closest proximity to sensitive receptors and communities are as follows:

Alternative 1 – Corridor 1 has a segment approximately one mile west of the housing area.

Alternative 5 – Corridor 5 has a segment approximately 3,000 feet south of Muroc Unified School District in North Edwards and a segment approximately one mile south of West Boron Elementary School.

3.9 SOCIOECONOMICS

This section provides an overview of the applicable plans, policies and regulations, as well as existing socioeconomic conditions, including employment and income. The proposed project study area includes Kern County, Los Angeles County, San Bernardino County, as well as local communities. This section provides the contextual background information for known socioeconomic resources within the proposed utility corridors (Corridors 1 through 6 and 9) which correspond to Alternatives 1 through 7.

The analysis of the proposed project's potential impacts on identified socioeconomic resources, as well as the recommendations for avoidance, reduction of, or mitigation measures necessary to address these potentially adverse impacts, are provided in Section 4.

3.9.1 Overview

3.9.1.1 Regional Setting

Edwards AFB is located approximately 100 miles north of Los Angeles in the Antelope Valley on the western edge of the Mojave Desert. Portions of the installation are within three California counties. The majority of the installation is in Kern County, with smaller areas being located within Los Angeles and San Bernardino Counties. The installation encompasses approximately 481 square miles (over 301,000 acres) and includes two major natural features -- Rogers and Rosamond Dry Lakes (Edwards Air Force Base, 2012b).

3.9.1.2 Socioeconomic Resources

Socioeconomic resources are the economic, demographic, and social assets of a community. Key elements include fiscal growth, population, labor force and employment, housing stock and demand, and school enrollment.

As Edwards AFB straddles the boundaries of Kern, Los Angeles and San Bernardino counties, it is situated in the vicinity of a number of communities, including Boron, California City, Lancaster, Mojave, North Edwards, Palmdale and Rosamond. The activities of all counties and

communities are taken into consideration in the socioeconomic analysis of the proposed utility corridor and its alternatives.

Population

Population within the three counties varies. Population estimates are summarized in Table 3-10.

Table 3-10 Study Area Population Estimates (2010-2014)

County	2010 Population	2014 Population	Percent Change 2010-2014
Kern	839,631	874,589	4.2%
Los Angeles	9,818,664	10,167,705	3.0%
San Bernardino	2,035,215	2,112,619	3.8%
CALIFORNIA	37,253,956	38,802,500	4.2%

Source: US Census Bureau, 2015

Income and Unemployment

A summary of income and unemployment statistics are presented in Table 3-11

Table 3-11 Study Area Income and Unemployment

County	Per Capita Income 2013 (\$)	Median Household Income 2013 (\$)	Unemployment 2015 (%)
Kern	\$20,295	\$29,527	10%
Los Angeles	\$27,749	\$55,909	7.1%
San Bernardino	\$21,332	\$54,090	6.1%
CALIFORNIA	\$48,552	\$61,094	6.3%

Source: US Census Bureau, 2015; US Bureau of Labor Statistics 2015

Employment and Industry

Edwards AFB makes a substantial contribution to the economic status of the surrounding communities within the Antelope Valley. Major industries in the area include agriculture, mining and tourism, in addition to aerospace technology (Edwards Air Force Base, 2012d).

The Antelope Valley has a labor force of approximately 157,900 persons with an unemployment rate of 14.1 percent. The labor force is employed in a variety of industries, including services,

manufacturing, construction/mining, retail, government and agriculture, according to the Greater Antelope Valley Economic Alliance 2010. As of December 10, 2010, Edwards AFB employed approximately 11,285 military, civilian and contractor personnel, according to the City of Lancaster, 2012 (Edwards Air Force Base, 2012d).

Edwards AFB is one of the largest employers in the Antelope Valley. In 2012, there was a daily workforce of 10,647, and an annual economic impact of \$1.52 billion to the local economy. A summary of the factors considered in estimating the total economic impact of Edwards AFB is shown in the Edwards Air Force Base Economic Impact Analysis (Edwards Air Force Base, 2012b).

Housing

Edwards AFB provides permanent housing for military members in the form of dormitories and military family housing. Edwards AFB has over 741 housing units with an occupancy rate goal of 98 percent. Housing is also available in the surrounding communities, including Lancaster, Palmdale, California City and Tehachapi.

Because the Proposed Action does not propose the addition or removal of housing, the analysis in this EA does not address impacts related to the availability of housing.

Community

Edwards AFB enjoys excellent relationships and support from the surrounding communities and local governments. Local cultural events, festivals, sports and other leisure pursuits, plus the attractions of the nearby Los Angeles metropolitan area make Edwards AFB a great jumping-off place for a myriad of activities. Numerous state and local parks and national parks are also close by (Edwards Air Force Base, 2012b).

Schools

There are 12 school districts within 100 miles of Edwards AFB. The ones that service Edwards AFB, North Edwards and Boron lie within the Muroc Unified School District, which has two

Kindergarten through 6th Grade elementary schools and two comprehensive junior/senior high schools with a total enrollment of about 2,000 students (Edwards Air Force Base, 2012b).

3.9.2 Socioeconomic Setting for Each Corridor

The Proposed Action effects on socioeconomic resources would primarily result from construction and installation activities, including land clearing, grading, excavating, trenching and installation of underground utilities. The majority of the area covered by the Alternatives is separated from sensitive receptors. The Alternatives with the closest proximity to sensitive receptors and communities are as follows:

Corridor 1 has a segment approximately one mile west of the housing area.

Corridor 5 has a segment approximately 3,000 feet south of Muroc Unified School District in North Edwards and a segment approximately one mile south of West Boron Elementary School.

3.10 WATER RESOURCES

3.10.1 Overview

Edwards AFB is located in a basin that is essentially closed with respect to both surface drainage and groundwater movement. Most of the precipitation of the region falls in higher elevations and any resulting storm water flow in ephemeral intermittent streambeds evaporates or infiltrates before it reaches lower elevations. There are no perennial streams on or near Edwards AFB.

Playa Lakebeds. Edwards AFB has permanent playa lake beds that are dry except during rainy seasons (Figure 3-12). The lakebeds and normally dry stream channels are subject to significant flooding after heavy, seasonal storms, as are claypan areas. Antelope Valley where Edwards AFB is located within is an approximate 2,400-square mile drainage basin in which storm water runoff is directed towards Rogers Dry Lake, Rosamond Dry Lake and Buckhorn Dry Lake. Any water that reaches these lakebeds remains until it evaporates.

Wetlands. Edwards AFB does not contain jurisdictional wetlands. Surface waters on the Base are primarily a result of constructed ponds and detention basins. Other aquatic habitats include

ephemeral clay playas and dry lakes. None of the aquatic features are jurisdictional due to a lack of connectivity or adjacency to navigable waters or waters otherwise used for interstate commerce. All permanent surface water on-base is a result of detention ponds and impoundments.

However, Edwards AFB does contain biological wetlands, primarily in the Piute Ponds Complex located in the southwestern corner of the Base. The Piute Ponds Complex (excluding Rosamond Dry Lake) encompasses approximately 5,614 acres. These areas are subject to flow from Sanitation District 14 (D14) Lancaster Wastewater Treatment Plant, and depending on the area, are perennially or seasonally flooded. Other seasonally flooded wetlands exist outside of this Water Management Area and receive water from natural ephemeral surface water as it flows to the lakebed. Additional wetland areas occur in some of the claypans on the Base.

Projects potentially impacting wetlands must comply with Executive Order (EO) 11990 *Protection of Wetlands*. EO 11990 requires agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. When Federally-owned wetlands or portions of wetlands are proposed for road, easement, right-of-way or disposal to non-Federal public or private parties, the Federal agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State or local wetlands regulations; and (b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successor except where prohibited by law; or (c) withhold such properties from disposal.

The southern portion of Corridor 3 crosses the Discovery Cove (19.69 acres), Coot Shoot (1.29 acres) and Mattquetty Marsh (45.09 acres) areas within the Piute Ponds Complex and is subject to EO 11990. These features are shown on Figure 3-11. The southern portion of Corridor 1 crosses some claypan areas that could be considered biological wetlands as well (Figure 3-13). Additional analysis would be required to fully assess potential impacts to wetlands and identify appropriate restrictions for the southern portion of Corridor 1 and Corridor 3.

Surface Water. The Antelope Valley drainage area is bounded by the San Gabriel and Tehachapi Mountain ranges. Major streams that drain this area include the Big Rock Wash, Little Rock Creek, Anaverde Creek, Amargosa Creek, Portal Ridge Wash and Fairmont Wash (Figure 3-12).

Flooding hazards have been determined at Edwards AFB and are illustrated on Figure 3-13 (EAFB, 2012b). The category of flood hazards is defined as follows:

- 100-Year Flood Plain where there is a 1 percent chance of a flood occurring in any given year;
- Inundated areas outside of the 100-Year Flood Plain and areas of 100-Year sheet flow with depths less than one foot; and
- Areas of possible inundation but with undetermined flood risk.

Flood hazards studies have been conducted at Edwards AFB for the most critical flood prone areas associated with Rogers Dry Lake and Rosamond Dry Lake. Mojave Creek is an ephemeral stream that originates from the Bissel Hills area found in the northeastern portion of the Base (Dinehart and Harmon, 1998). Flooding hazards from Mojave Creek have the potential for impacting areas near Main Base (Figure 3-13). Construction activities subsequent to the Mojave Creek floodplain delineation have likely altered the flooding hazard. A new Mojave Creek floodplain delineation is planned in the near future.

Groundwater. Edwards AFB overlies portions of the following groundwater basins that are part of the South Lahontan Hydrologic Region:

- Antelope Valley Groundwater Basin (No. 6-44);
- Fremont Valley Groundwater Basin (No. 6-46);
- Harper Valley Groundwater Basin (No. 6-47); and
- Middle Mojave River Valley Groundwater Basin (No. 6-41) (California Department of Water Resources 2004).

Edwards AFB also overlies portions of three groundwater subbasins as defined by the United States Geological Survey (USGS, 2005):

- Lancaster and North Muroc Subbasins within the boundary of the Antelope Valley Groundwater Basin; and

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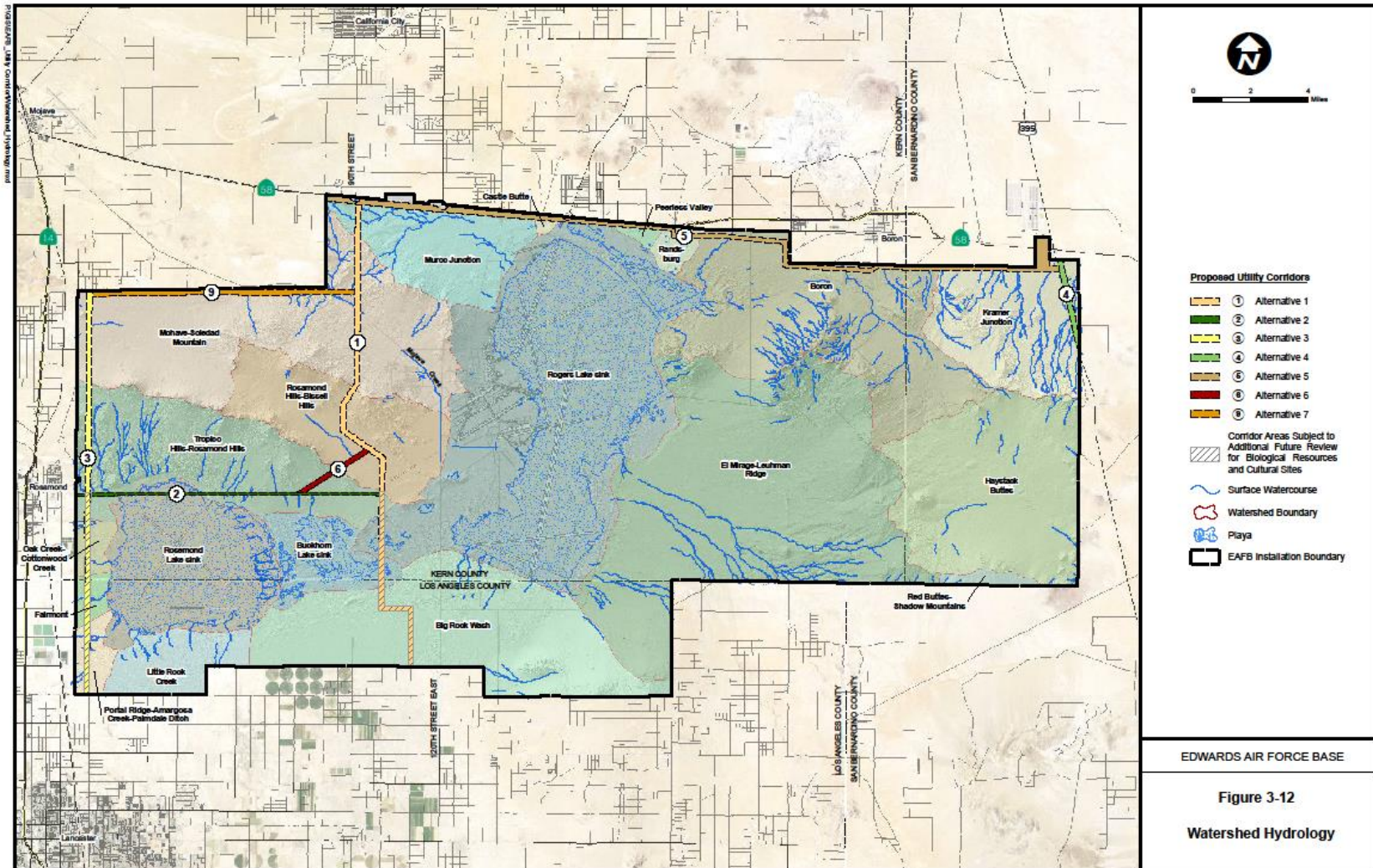


Figure 3-12 Watershed Hydrology

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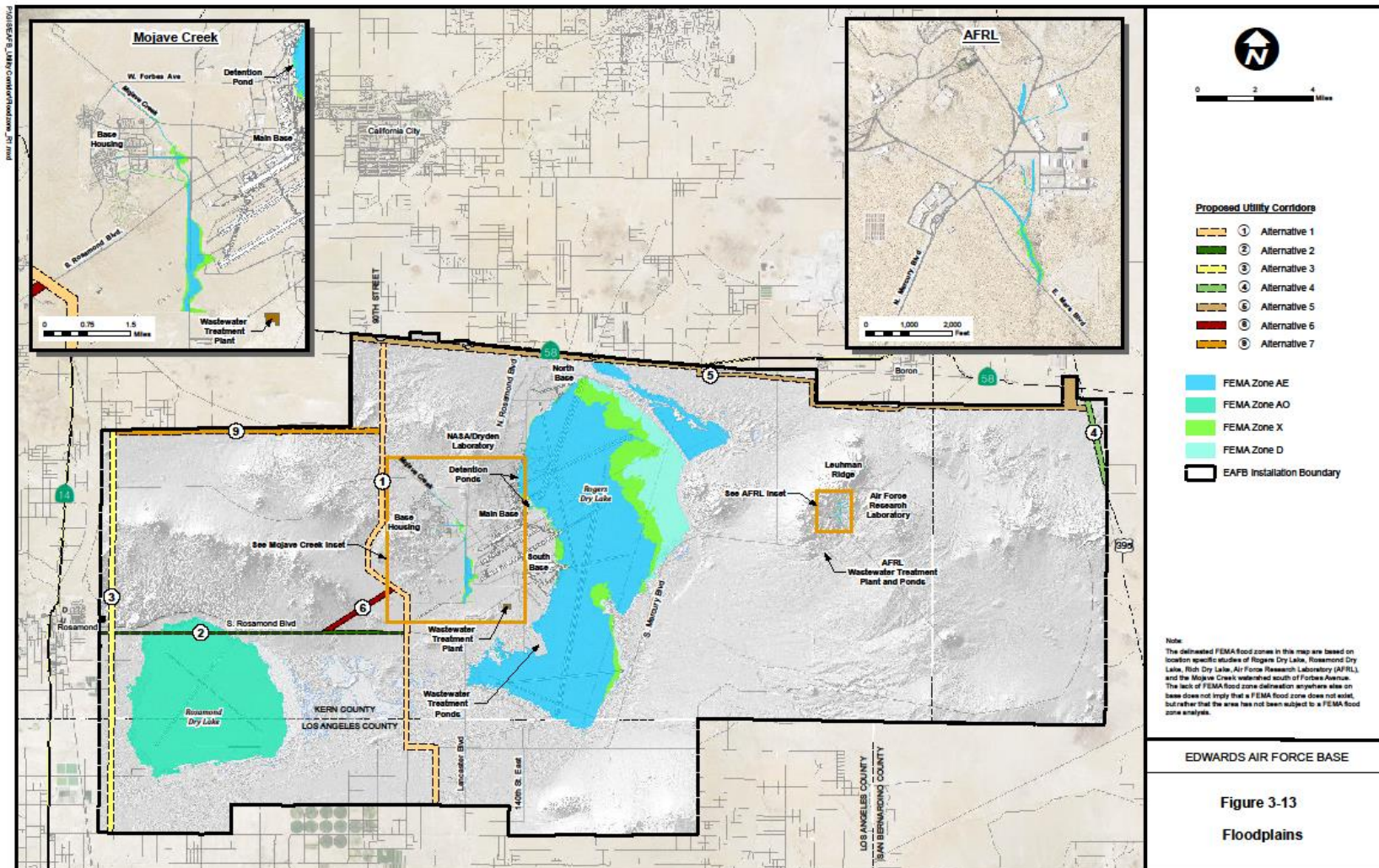


Figure 3-13 Floodplains

- Gloster Subbasin within the boundary of the Fremont Valley Groundwater Basin.

In addition to these subbasins, Edwards AFB also encompasses areas of bedrock outcrops and shallow bedrock in the Rosamond and Bissell Hills (west and northwest part of the Base), the Hi Vista Area (south central and southeast part of the Base) and Leuhman Ridge in the area of the AFRL.

Groundwater at Edwards AFB occurs mainly in unconsolidated alluvial deposits in these groundwater basins and subbasins. In the Lancaster Subbasin, the unconsolidated alluvial deposits are known to exceed thicknesses of 1,500 feet.

Depth to groundwater in a middle aquifer used for beneficial purposes from water supply wells on-Base is generally between 250 and 750 feet below ground surface (bgs).

3.10.2 Alternative 1 - Corridor 1

Playa Lake Bed. Corridor 1 spans from the Southern Base boundary (120th Street) to the northern boundary. The southern portion of this alternative crosses a portion of the playa complex associated with Buckhorn Dry Lake. Because of the potential for crossing biological wetlands in this playa complex, the southern portion of Corridor 1 would be subject to additional environmental analysis at the time a specific project is proposed and, therefore, is not subject to the FONSI or FONPA associated with the Proposed Project.

Surface Water. A small portion of the northern section of Corridor 1 crosses Mojave Creek. Other unnamed ephemeral drainages appear to be bisected by this alternative. There are no delineated floodplains associated with this corridor.

Groundwater. The following groundwater basins lie beneath Corridor 1:

- Muroc Junction;
- Mojave-Soledad Mountain;
- Rosamond Hills-Bissell Hills;

- Tropico Hills-Rosamond Hills;
- Rogers Lake Sink;
- Buckhorn Lake Sink; and
- Big Rock Wash.

3.10.3 Alternative 2 - Corridor 2

Playa Lake Bed. This utility corridor begins at the western boundary of the Base at Rosamond Boulevard and runs parallel to Rosamond Boulevard. The western portion of Corridor 2 crosses the northern portion of Rosamond Dry Lake within the current easement of Rosemond Boulevard.

Surface Water. Unnamed ephemeral drainages appear to be bisected by this alternative. This corridor passes through the northern end of the Rosamond Dry Lakebed, a designated 100-year floodplain; therefore a Finding of No Practicable Alternative will be required.

Groundwater. The following groundwater basins lie beneath Corridor 2:

- Tropico Hills-Rosamond Hills; and
- Rosamond Lake Sink.

3.10.4 Alternative 3 - Corridor 3

Playa Lake Bed. This utility corridor, also known as the Shuttle Road Corridor, follows Shuttle Road at the western-most edge of the Base running from Avenue E to the south, to the northern boundary of the Base at Trotter Road. It would not bisect any of the dry lake beds at Edwards AFB.

Surface Water. A number of unnamed ephemeral drainages appear to be bisected by this alternative. While there are no delineated floodplains associated with this corridor, it does cross three features that are part of the Piute Ponds Complex: Discovery Cove, Coot Shoot and Mattquetty Marsh, shown on Figure 3-11. Because of the potential for crossing biological wetlands in the Piute Ponds Complex, the southern portion of Corridor 3 would be subject to

additional environmental analysis at the time a specific project is proposed and, therefore, is not subject to the FONSI or FONPA associated with the Proposed Project.

Groundwater. The following groundwater basins lie beneath Corridor 3:

- Mojave-Soledad Mountain
- Tropico Hills-Rosamond Hills
- Oak Creek-Cottonwood Creek;
- Fairmont; and
- Portal Ridge-Amargosa Creek-Palmdale Creek.

3.10.5 Alternative 4 - Corridor 4

Playa Lake Beds. This utility corridor traverses the north eastern corner of the Base, following U.S. Route 395 where there are current electrical easements. It would not bisect any of the dry lake beds at Edwards AFB.

Surface Water. A number of unnamed ephemeral drainages appear to be bisected by this alternative. There are no delineated floodplains associated with this corridor.

Groundwater. The following groundwater basin lies beneath Corridor 4:

- Kramer Junction

3.10.6 Alternative 5 - Corridor 5

Playa Lake Beds. This utility corridor begins at the northern boundary of the Base and parallels State Route 58 and terminates at the north eastern corner of the Base at Kramer Junction. The northernmost portion of Rogers Dry Lake would be crossed by this alternative.

Surface Water. A number of unnamed ephemeral drainages appear to be bisected by this alternative. There are no delineated floodplains associated with this corridor.

Groundwater. The following groundwater basins lie beneath Corridor 5:

- Kramer Junction;
- Boron;

- Randsburg;
- Peerless Valley;
- Rogers Lake Sink;
- Castle Butte; and
- Muroc Junction.

3.10.7 Alternative 6 - Corridor 6

Playa Lake Beds. This utility corridor runs from mid-Rosamond Boulevard and connects to either Corridor 1 or Corridor 2. It would not bisect any of the dry lake beds at Edwards AFB.

Surface Water. A number of unnamed ephemeral drainages appear to be bisected by this alternative. There are no delineated floodplains associated with this corridor.

Groundwater. The following groundwater basins lie beneath Corridor 6:

- Rosamond Hills-Bissell Hills; and
- Tropico Hills-Rosamond Hills.

3.10.8 Alternative 7 - Corridor 9

Playa Lake Beds. This utility corridor is the northwestern connection from the northwestern edge of the Base to tie into Corridor 1. It would not bisect any of the dry lake beds at Edwards AFB.

Surface Water. A small portion of the eastern section Corridor 9 would cross Mojave Creek. Other unnamed ephemeral drainages appear to be bisected by this alternative. There are no delineated floodplains associated with this corridor.

Groundwater. The following groundwater basin lies beneath Corridor 9:

- Mojave-Soledad Mountain.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents the potential environmental consequences that could result from implementation of the various utility corridor alternatives. Possible changes to the natural and human environment that could result from the project alternatives were evaluated relative to existing environmental conditions described within Chapter 3.0. Mitigation measures are presented that would mitigate potentially significant adverse impacts to a level that is not significant. This chapter also provides a discussion of cumulative impacts, unavoidable adverse effects, short-term uses versus long-term productivity of the environment and the irreversible and irretrievable commitment of resources.

4.1 AIR QUALITY AND GREENHOUSE GASSES

Emissions resulting from the construction within most corridors would originate primarily within Kern County, but emissions resulting from construction within Corridors 1 and 3 would partially originate within Los Angeles County. Emissions resulting from Corridor 5 would partially originate within San Bernardino County and emissions resulting from Corridor 4 would originate entirely within San Bernardino County. The Kern County portion of the Proposed Action is under the jurisdiction of the EKAPCD. The Los Angeles County portion of the Proposed Action is under the jurisdiction of the AVAQMD. The San Bernardino County portion of the Proposed Action is under the jurisdiction of the MDAQMD. Each of these air districts has set thresholds of significance for criteria pollutants and GHGs which must not be exceeded in order to ensure that the Proposed Action emissions are consistent with air quality management plans and GHG goals.

The air and GHG emissions resulting from the Proposed Action would be short-term construction emissions, which are temporary emissions generated during the construction of a project. Short-term emissions are typically generated by on-road (e.g., employee vehicles and vendor/delivery trucks) and off-road vehicles or equipment (e.g., backhoes, bulldozers, portable

generators and cranes), as well as dust generation due to clearing, grading, excavating and trenching activities. Short-term emissions end once the construction phase is completed.

Long-term or operational emissions are not expected to occur on a regular basis. After the construction phase is completed, areas of disturbance would be revegetated or restored. In addition, incidental unpredictable emissions are expected to result from maintenance-related activities, which may not occur for many years after the construction phase is completed. Consequently, long-term emissions are not addressed in this EA.

4.1.1 Methodology

All of the Proposed Action corridors, with the exception of the southern portions of Corridors 1 and 3, have been deemed suitable for underground installation of gas, water, communications, electric and power transmission lines. Therefore, construction emissions would result primarily from activities including land clearing, cut and fill, excavation, trenching and delivery of materials.

Once approved, the Proposed Action would likely be completed one corridor at a time and one or multiple projects at a time within each corridor. For the purpose of estimating air emissions in this EA, a project area was estimated for installation of up to five utility lines at a time for each corridor. The project area was estimated by calculating the product of the length of the corridor times a 20-foot width for each utility line type (i.e., gas, water, communications, electric and power transmission lines) for which the corridor has been deemed suitable. This approach assumes that installation of four to five utility lines takes place under one project at a time for each corridor and that the project area would undergo clearing, grading, excavation and trenching to accommodate vehicle and equipment access and for the installation of piping, conduit and cables. It is likely that with the use of horizontal directional boring, much of the clearing, grading, excavation and trenching would be significantly reduced. Additional emissions calculations and significance determination would need to be conducted at the project level for each specific project having different dynamics from those assumed this EA.

The short-term construction emissions in this EA were calculated using California Emissions Estimator Model (CalEEMod), which provides a platform for calculating emissions from a land use project. CalEEMod is designed to calculate both daily and annual emissions of criteria pollutants and GHGs. It also features built-in default values that can be used to calculate construction emissions. Default values are based on construction surveys conducted by the South Coast Air Quality Management District in order to develop default equipment usage and construction phase lengths. Calculated emissions and assumptions used in the calculations are included in Appendix C and are summarized in each of the Proposed Action's seven alternatives (i.e., one for each of seven corridors) addressed in the following sections.

4.1.2 Significance Criteria and Analysis

The alternative with the largest estimated project area is Corridor 5, having an estimated project area of 291 acres, 242 acres of which are located in Eastern Kern County and within the jurisdiction of EKAPCD. Since the largest amount of emissions generated would be for Corridor 5, it will be used to evaluate significance for all corridors. For the purposes of air analysis, Corridor 5 is assumed to be completed over a three-month period. Extending the construction period would further serve to minimize air emissions. Construction equipment specifics (e.g., type, hours of operation, horse power and length of use) and on road vehicles (e.g., construction crew and vendor vehicles) miles traveled used in the calculation of emissions are listed in Appendix C.

Calculated construction emissions are compared against *de minimis* thresholds to determine whether or not conformity determination is required and are compared against significance thresholds to determine whether or not each alternative may have any significance effect in the environment. Table 4-1 provides calculated emissions from Corridor 5, thresholds of significance published by each of the air districts affected by the Proposed Action, *de minimis* thresholds for conformity analysis, and significance status. For all pollutants, including dust-related pollutants (PM₁₀ and PM_{2.5}), the proposed project would not exceed significance thresholds or *de minimis* thresholds.

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Table 4-1 Project Air Emissions of Criteria Pollutants and GHGs and Thresholds

Project Phase and Thresholds	CO	VOC	NO _x	SO ₂	PM ₁₀	PM _{2.5}	H ₂ S	Lead	CO ₂ e
Construction Emissions in tpy (lb/day)	6.12 (47.61)	0.25 (1.94)	4.63 (35.59)	0.01 (.08)	1.21 (9.23)	0.61 (5.47)	0 (0)	0 (0)	1,044.74 (8,186.65)
^{a,b} EKAPCD Significance Threshold in tpy (lb/day)	None	25 (137)	25 (137)	None	15 (82)	None	None	None	25,000 (136,986)
^d AVAQMD and ^e MDAQMD Significance Threshold in tpy (lb/day)	100 (548)	25 (137)	25 (137)	25 (137)	15 (82)	15 (82)	10 (54)	0.6 (3)	100,000 (548,000)
<i>De minimis</i> Thresholds (tpy)	N/A	¹ 100/ ² 25	¹ 100/ ² 25	N/A	³ 100	N/A	N/A	N/A	N/A
Significant?	No	No	No	No	No	No	No	No	No

Source: a Source for criteria pollutants: County of Kern 2006

b Source for CO₂e: EKAPCD 2012

c AVAQMD 2011

d MDAQMD 2011

Notes: 1 *de minimis* threshold for Eastern Kern County

2 *de minimis* threshold for Los Angeles County portion of the AVAQMD

3 *de minimis* threshold for San Bernardino County portion of the MDAQMD

AVAQMD Antelope Valley Air Quality Management District

CO carbon monoxide

CO₂e carbon dioxide equivalent

EKAPCD Eastern Kern Air Pollution Control District

GHG greenhouse gas

H₂S hydrogen sulfide

lb/day pounds per day

MDAQMD Mojave Desert Air Quality Management District

N/A not applicable

NO_x nitrogen oxides (nitrogen oxide and nitrogen dioxide)

PM_{2.5} particulate matter less than 2.5 microns in diameter

PM₁₀ particulate matter less than 10 microns in diameter

SO_x sulfur dioxide

tpy tons per year

VOC volatile organic compound

Air emissions from alternatives 1, 2, 3, 4, 6 and 7 would be less than those calculated for Corridor 5 and, therefore, would also be *de minimis*. The implementation of Minimization Measures Air (MinMAIR) MinMAIR-1 through MinMAIR-13 would further reduce impacts to a less than significant level for all alternatives in Corridors 1, 2, 3, 4, 5, 6 and 9.

MinMAIR-1: Project activities shall comply with all applicable rules and regulations as identified in AFI 32-7040, *Air Quality Compliance and Resource Management* (2007).

MinMAIR-2: The project shall comply with all applicable EKAPCD, MDAQMD or AVAQMD rules and regulations and obtain the necessary air quality permits. Emissions from permitted devices and activities must be tracked and reported to the CARB, the appropriate air district and the U.S. EPA. Air quality permits, if required, shall be coordinated through the Environmental Management Division. The Environmental Management Division is the lead agency for the application and maintenance of air quality permits on Edwards AFB. Very few, if any, air quality permits would be required for this project as the majority of emissions will be due to mobile sources.

MinMAIR-3: Any internal combustion engine subject to NESHAP or New Source Performance Standards requirements must be permitted by the local AQMD/APCD. Based on recent revisions to the Reciprocating Internal Combustion Engine NESHAP, all stationary generators are now subject to the regulation regardless of size – this in turn makes them subject to permitting requirements. Permitting is also required (retroactively) for any non-road engine that fails the indicia of portability (i.e. exceeds the 12-month time limit). If such equipment is to remain on base less than 45 calendar days, a written exemption must be obtained from the local air agency.

MinMAIR-4: The proposed project shall not discharge from any source whatsoever, such quantities of air contaminants or other material that would: cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public; endanger the comfort, repose, health or safety of any such persons or the public; or cause or have a natural tendency to cause injury or damage to business or property.

MinMAIR-5: All earthwork activities shall be planned and conducted to minimize the duration that soils would be left unprotected. The extent of the area of disturbance necessary to accomplish the project shall be minimized. Exposed surfaces shall be periodically sprayed with water.

MinMAIR-6: Visible emissions (e.g., dust or smoke) from the proposed projects shall not exceed the limitations as outlined by the local air district.

MinMAIR-7: Apply water or dust suppressants to roads and open areas where dust is being generated. If winds produce excessive visible emissions, erect wind barriers.

- Do not grade or till compacted dirt without applying water or dust suppressant.

MinMAIR-8: Discontinue grading and other ground-disturbing activities at wind speeds exceeding 25 miles per hour.

MinMAIR-9: All vehicles transporting fill material or debris shall be covered to reduce PM_{2.5} and PM₁₀ emissions during transport.

MinMAIR-10: Temporary coverings must be installed over open storage piles.

MinMAIR-11: All mechanical and construction equipment shall be kept in good working order according to applicable technical orders and the manufacturer's equipment maintenance manuals to reduce emissions to acceptable levels.

MinMAIR-12: The following dust control measures will be implemented during land preparation (i.e., clearing, grading, etc.), excavation and/or post-construction:

- All soil excavated or graded should be sufficiently watered to prevent excessive dust.

Watering should occur as needed with complete coverage of disturbed soil areas. Watering should be a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations.

- All clearing, grading, earth moving and excavation activities shall cease during periods of winds greater than 20 miles per hour (mph) (averaged over one hour), if disturbed material is easily windblown or when dust plumes of 20% or greater opacity impact public roads, occupied structures or neighboring property.

- All fine material transported off site should be either sufficiently watered or securely covered to prevent excessive dust.

- All haul trucks should be required to exit the site via an access point where a gravel pad or grizzly has been installed.

- Stockpiles of soil or other fine loose material shall be stabilized by watering or other appropriate method to prevent wind-blown fugitive dust.

- Once clearing or grading has ceased, all inactive soil areas within the project area shall either be seeded and watered until plant growth is evident, treated with a dust palliative or watered twice daily until soil has sufficiently crusted to prevent fugitive dust emission.

- On-site vehicle speed should be limited to 15 mph.

- All areas with vehicle traffic should be paved, treated with dust palliatives or watered a minimum of twice daily.

- Streets adjacent to the project site should be kept clean and accumulated silt removed.

- Revegetation/restoration shall be required based on the level of disturbance created from project activities. Revegetation/restoration shall be in accordance with the *Edwards Air Force Base Revegetation Plan* (AFFTC/EM 1994).

MinMAIR-13: The following measures should be implemented to control construction vehicle tailpipe emissions:

- Properly maintain and tune all internal combustion engine powered equipment;
- Require employees and subcontractors to comply with the ARB idling restrictions for compression ignition engines; and
- Use CARB diesel fuel.

4.1.3 Alternative 8 - No Action Alternative

Under the No Action Alternative (Alternative 8), the Air Force would not provide for designated utility corridors, but would use existing routes or new, undesignated utility routes. New utility routes would continue to be considered on a case-by-case basis. Each new utility route would be required to assess all related air quality and GHG impacts on the environment. Mitigation measures would need to be reassessed based on the dynamics of project level actions.

4.2 CULTURAL RESOURCES

This section addresses resource types or cultural context (e.g., Prehistoric, Historic-period, Sub-modern) that have been identified in the general area, along with those resources deemed eligible under the NRHP, California Register of Historical Places (CRHP) or California Historic Landscape (CHL), or are considered of tribal interest. Impacts on cultural resources and paleontological resources could result from ground-disturbing activities and/or damage, destruction or alteration of historic structures. Ground-disturbing activities include project-related excavation, grading, trenching, vegetation clearance, the operation of heavy equipment, installation of utility poles or other surface and sub-surface disturbance that could damage or destroy surficial or buried cultural resources including prehistoric or historic period archaeological resources, paleontological resources or human burials.

Hale and Hanten (2014) conducted a cultural resources survey for the proposed Utility Corridor ADP; the project considered seven utility corridors as the Area of Potential Effect (APE) for the proposed undertaking. The APE encompassed a total of 9,276 acres (94.5 linear miles) of land, including much of the proposed Utility Corridors 1, 2, 3, 4, 5, 6 and 9 (Hale and Hanten, 2014). As indicated in Section 3.2.3, based on past land use activities in the Regional Area and prior cultural resources studies (Hale and Hanten, 2014), multiple types of cultural resources have been identified within the proposed utility corridors (Table 4-2).

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Table 4-2
Types of Cultural Resources Identified within Proposed Utility Corridors

Site Type	Corridor 1	Corridor 2	Corridor 3	Corridor 4	Corridor 5	Corridor 6	Corridor 9
PREHISTORIC							
Base Camp/Village	X						
Lithic Deposits	X	X	X	X	X		X
Roasting Pit/Hearth			X			X	
Temporary Camp	X	X	X		X		X
Cremation					X		
Quarry/Lithic Source			X	X			X
Pot Drop/Ceramic Deposit	X						
Cairn Features						X	
Milling Stations							X
HISTORIC PERIOD							
Agricultural or Ranching Features	X				X		X
Homesteads or Duck Clubs	X	X	X		X		X
Refuse Deposits	X	X	X	X	X	X	X
Mining Features	X	X	X				
Railroads/Labor Camps	X				X		X
Townsite/Settlement	X						
Military and Aircraft Crashes						X	
Rock Cairns			X	X			X
OTHER							
SUBMODERN FEATURES			X				X
MULTI-COMPONENT							
BUILT ENVIRONMENT	X				X		
ISOLATED FINDS							

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The results of the cultural resources survey provided an inventory rather than a formal evaluation of the cultural resources identified within each corridor; this aided in the assessment of the risk of adverse effects (Hale and Hanten, 2014). A total of 341 archaeological sites have been identified within the APE, encompassing a total of 1,820.02 acres (19.6%) of the proposed project acreage (Table 4-3).

Table 4-3
Summary of Cultural Resources Associated with Proposed Utility Corridors

Corridor	Length (Miles)	Width (Feet)	Acres	No Prior Survey (Acres)	Expired Surveys (Acres)	Required Survey (Acres)	Total Number of Cultural Resources	Total Cultural Site Acreage	% of Corridor Covered by Cultural Resources
1	20	1,000	2,195	97	1,076	1,173	65	931.42	42.4%
2	12	500	640	307	328	635	22	108.94	17%
3	15.5	1,000	1,706	1,009	261	1,270	83	218.23	12.8%
4	2	1,000	354	0	16	16	11	22.76	6.4%
5	30	1,000	3,115	721	406	406	106	374.66	12%
6	4	500	166	44	74	74	5	2.79	1.7%
9	11	1,000	1,100	n/a	n/a	n/a	53	161.22	14.6%
Total	94.5	Varies	9,276	2,183	2,161	4,339	345	1,820.02	19.6%

A discussion of the resources associated with each corridor is provided in the section below. In summary, Corridors 4 and 6 had the lowest frequency of sites and the least area covered by sites, while Corridor 5 had the highest frequency of sites (Hale and Hanten, 2014). Note that the cultural resources within Corridor 1 cover more acreage than other corridors (Hale and Hanten, 2014).

Mitigation Measure Cultural (MMCUL) would reduce impacts to a less than significant level for alternatives 1, 2, 3, 4, 5, 6 and 9, with the exception of the southern portions (from Rosamond Boulevard to southern Base boundary) of Corridors 1 and 3, where the density and sensitivity of

cultural resources is expected to be high and have not been formally evaluated for eligibility to be listed in the NRHP. Further analysis would be required prior to project approval and construction in these areas.

MMCUL: Avoidance is the preferred treatment for NRHP-eligible cultural resources. If avoidance is not possible, then resources will need to be evaluated prior to any development and construction along a proposed corridor, and any potentially NRHP-eligible resources will require resolution of the adverse effects. Construction monitoring may be implemented in areas where subsurface cultural resources are anticipated. Additional site-specific mitigation may be implemented prior to developing the selected corridor.

4.2.1 Alternative 8 – No Action Alternative

Under Alternative 8, there would be no action and no cultural resources would be affected by the proposed undertaking. Therefore, no mitigation for cultural resources would be warranted.

4.3 GEOLOGY AND SOILS

This section describes the geologic hazards and soil resources impacts that would occur with the implementation of any of the alternative utility corridors chosen. The analysis evaluates the impacts of construction plus operation and maintenance.

4.3.1 Methodology

The potential impacts resulting from geologic hazards were evaluated by assessing if there would be life/safety concerns or impacts to proper function of any alternative utility corridor as a result of a seismic event. The potential impact of loss of soils due to erosion by either water or wind was also evaluated. Available published resources were reviewed including journal articles and maps available on the internet and soils information provided by the NRCS.

4.3.2 Significance Criteria

The geology and soils resources found within each alternative under analysis includes geological features and soils. Other aspects of these resources include earthquakes, subsidence, unstable slopes and other hazards that limit siting and construction of any of the proposed alternatives.

The following criteria were used in evaluating the significance of impacts related to the geology and soil resources found within the alternative utility corridors.

- The degree to which unique or scenic landforms and topographic features would be damaged, destroyed, or rendered inaccessible by construction;
- The degree to which the stability of slopes and foundation substrates may be lessened by excavation or grading;
- The potential for naturally occurring geological events including subsidence, landslides and mudflows, and rupture and ground shaking during earthquakes, to affect construction and the operation of the selected utility corridor;
- The amount of disruption of the ground surface and destruction of the soil profile through excavation and removal of rock and soil in the construction of any alternative selected;
- The potential for erosion caused by disturbance of the ground surface during the construction of any alternative selected particularly as a result of exposing construction areas and equipment routes to increased potential for wind or storm water soil loss; and
- The potential for soil conditions such as corrosivity and swell-shrink that may affect construction and operation of the selected utility corridor.

The following criterion was determined to be inapplicable or to result in no impact under all alternatives and, and therefore, is not discussed further in this section.

- Alquist-Priolo Earthquake Fault Zone:

No component associated with the Project has been identified within an Alquist-Priolo Earthquake Fault Zone. There would be no impacts under this criterion for project alternative.

4.3.3 Alternative 1 - Corridor 1

Construction of Corridor 1 would not damage or destroy existing landforms found within this alignment. Construction and maintenance activities would require establishing an access road

parallel to the utility line. This alternative has the potential to be impacted by geology that may be unstable during a seismic event. Naturally occurring geological events including subsidence, landslides and mudflows, and rupture and ground shaking during earthquakes have the potential to affect construction and operation of a utility line within Corridor 1.

Most of Corridor 1 has a high potential for soil loss due to wind erosion during construction of the project and a very high potential for soil loss due to rill and sheet flow erosion. However the southern portion of the alternative would be placed in Sparkhule very gravelly loam that has a very high WEG rating which corresponds to a low potential for wind-caused erosion (Table 4-4). Once construction has concluded, potential loss of soil due to wind or storm water erosion would not likely exceed current undeveloped conditions due to implementation of MinMAIR-12 (provided in Section 4.1, Air Quality).

Table 4-4
Wind Erodibility Group plus Water Erosion Factor for Alternative 1, Corridor 1

Soil Type	Wind Erodibility Group	Rill and Sheet Flow K-Factor
Helendale loamy sand	2	0.24
Muroc sandy loam	3	0.24
Cajon-Challenger Complex	2	0.24
Leuhman-Challenger-Cajon Complex	3	0.37
Sparkhule very gravelly loam	7	0.43

The following minimization measures would reduce potential impacts from a naturally-occurring seismic events and potential wind or storm water erosion of soils associated with development in Corridor 1.

MMGEO-1: Prior to final design of the Alternative, a combined geotechnical engineering and engineering geology study should be conducted by a qualified geologist/engineer to identify site-specific geologic conditions and potential geologic hazards in sufficient detail to support sound

engineering. Appropriate mitigations for identified geological hazards would be identified in the geotechnical study

MMGEO-2: Prepare and implement a construction SWPPP prior to the commencement of soil disturbance activities associated with construction.

MMGEO-3: Use non-hazardous dust suppression palliatives approved by Edwards AFB and water on an as-needed basis to suppress wind-blown dust generated at the site during construction. Dust suppression palliatives are materials that work by either agglomerating the fine particles, adhering/binding the surface particles together or increasing the density of the surface material.

MMGEO-4: Implement erosion control measures during construction, including stabilization of construction areas, employing a concrete wash out area, as needed, and tire washes near the entrance to existing roadways.

MMGEO-5: Use silt fences for erosion control in the event of a storm event.

In addition, implementation of MinMAIR-12 (addressing dust-control and described in Section 4.1, Air Quality) would further reduce erosion-related impacts.

4.3.4 Alternative 2 - Corridor 2

Construction of Corridor 2 would not damage or destroy existing landforms found within this alignment. Construction and maintenance activities would require establishing an access road parallel to the utility line. This alternative has the potential to be impacted by geology that may be unstable during a seismic event. Naturally occurring geological events including subsidence, landslides and mudflows, and rupture and ground shaking during earthquakes have the potential to affect construction and operation of a utility line within Corridor 2.

Corridor 2 has a high potential for soil loss due to wind erosion during construction and a very high potential for soil loss due to rill and sheet flow erosion (Table 4-5). Once construction has

concluded, potential loss of soil due to wind or storm water erosion would not likely exceed current undeveloped conditions due to implementation of MinMAIR-12 (addressing dust-control and described in Section 4.1, Air Quality).

Table 4-5
Wind Erodibility Group plus Water Erosion Factor, Alternative 2, Corridor 2

Soil Type Present in Alternative	Wind Erodibility Group	Rill and Sheet Flow K-Factor
Muroc sandy loam	3	0.24
Helendale-Randsburg Complex	2	0.24
Leuhman loamy sand	2	0.28
Helendale find sandy loam	3	0.28
Lavic-Norob Complex	2	0.24

Incorporation of Mitigations MMGEO-1 through MMGEO-5 and MinMAIR-12 would reduce potential impact from a natural seismic event and wind or storm water erosion during construction to a level that is not significant.

4.3.5 Alternative 3 - Corridor 3

Construction of Corridor 3 would not damage or destroy existing landforms found within this alignment. Construction and maintenance activities would require establishing an access road parallel to the utility line. This alternative has the potential to be impacted by geology that may be unstable during a seismic event. In addition, the southern portion of Corridor 3 would be located in an area that has been determined historically to be subject to liquefaction. Naturally occurring geological events including subsidence, landslides and mudflows, and rupture and ground shaking during earthquakes have the potential to affect construction and the operation of Corridor 3.

Corridor 3 has a high potential for soil loss due to wind erosion during construction and a very high potential for soil loss due to rill and sheet flow erosion (Table 4-6). Once construction has concluded, potential loss of soil due to wind or storm water erosion would not likely exceed current undeveloped conditions due to implementation of MinMAIR-12 (addressing dust-control and described in Section 4.1, Air Quality).

Table 4-6
Wind Erodibility Group plus Water Erosion Factor, Alternative 3, Corridor 3

Soil Type Present in Alternative	Wind Erodibility Group	Rill and Sheet Flow K-Factor
Leuhman-Challenger-Cajon Complex	3	0.37
Leuhman-Cajon Complex	2	0.28
Leuhman loamy sand	2	0.28
Randsburg-Machone-Rock Outcrop Complex	3	0.32
Helendale-Cajon Complex	2	0.24
Destazo Complex	3	0.28

Incorporation of Mitigations MMGEO-1 through MMGEO-5 and MinMAIR-12 would reduce potential impact from a natural seismic event and wind or storm water erosion during construction to a level that is not significant.

4.3.6 Alternative 4 - Corridor 4

Construction of Corridor 4 would not damage or destroy existing landforms found within this alignment. Construction and maintenance activities would require establishing an access road parallel to the utility line. This alternative has the potential to be impacted by geology that may be unstable during a seismic event. Naturally occurring geological events including subsidence, landslides and mudflows, and rupture and ground shaking during earthquakes have the potential to affect construction and the operation within Corridor 4.

Corridor 4 has a high potential for soil loss due to wind erosion during construction and has a very high potential for soil loss due to rill and sheet flow erosion (Table 4-7). Once construction has concluded, potential loss of soil due to wind or storm water erosion would not likely exceed current undeveloped conditions due to implementation of MinMAIR-12 (addressing dust-control and described in Section 4.1, Air Quality).

Table 4-7
Wind Erodibility Group plus Water Erosion Factor, Alternative 4, Corridor 4

Soil Type Present in Alternative	Wind Erodibility Group	Rill and Sheet Flow K-Factor
Hi Vista sandy loam	3	0.28
Norob Complex, overblown soils	1	0.15

Incorporation of Mitigations MMGEO-1 through MMGEO-5 and MinMAIR-12 would reduce potential impact from a natural seismic event and wind or storm water erosion during construction to a level that is not significant.

4.3.7 Alternative 5 - Corridor 5

Construction of Corridor 5 would not damage or destroy existing landforms found within this alignment. Construction and maintenance activities would require establishing an access road parallel to the utility line. This alternative has the potential to be impacted by geology that may be unstable during a seismic event. Naturally occurring geological events including subsidence, landslides and mudflows, and rupture and ground shaking during earthquakes have the potential to affect construction and operation of within Corridor 5.

Corridor 5 has a high potential for soil loss due to wind erosion during construction and has a very high potential for soil loss due to rill and sheet flow erosion (Table 4-8). Once construction has concluded, potential loss of soil due to wind or storm water erosion would not likely exceed current undeveloped conditions due to implementation of MinMAIR-12 (addressing dust-control and described in Section 4.1, Air Quality).

Table 4-8
Wind Erodibility Group plus Water Erosion Factor, Alternative 5, Corridor 5

Soil Type Present in Alternative	Wind Erodibility Group	Rill and Sheet Flow K-Factor
Helendale loamy sand	2	0.24
Helendale fine sandy loam	3	0.28
Cajon-Norob Complex	2	0.24
Muroc-Randsburg Complex	3	0.24
Norob-Complex, overblown	1	0.15
Cajon loamy coarse sand	2	0.20

Incorporation of Mitigations MMGEO-1 through MMGEO-5 and MinMAIR-12 would reduce potential impact from a natural seismic event and wind or storm water erosion during construction to a level that is not significant.

4.3.8 Alternative 6 - Corridor 6

Construction of Corridor 6 would not damage or destroy existing landforms found within this alignment. Construction and maintenance activities would require establishing an access road parallel to the utility line. This alternative has the potential to be impacted by geology that may be unstable during a seismic event. Naturally occurring geological events including subsidence, landslides and mudflows, and rupture and ground shaking during earthquakes have the potential to affect construction and the operation within Corridor 6.

Corridor 6 has a high potential for soil loss due to wind erosion during construction and a very high potential for soil loss due to rill and sheet flow erosion (Table 4-9). Once construction has concluded, potential loss of soil due to wind or storm water erosion would not likely exceed current undeveloped conditions due to implementation of MinMAIR-12 (addressing dust-control and described in Section 4.1, Air Quality).

Table 4-9
Wind Erodibility Group plus Water Erosion Factor, Alternative 6, Corridor 6

Soil Type Present in Alternative	Wind Erodibility Group	Rill and Sheet Flow K-Factor
Helendale-Randsburg Complex	2	0.24
Helendale loamy sand	2	0.24
Helendale fine sandy loam	3	0.28

Incorporation of Mitigations MMGEO-1 through MMGEO-5 and MinMAIR-12 would reduce potential impact from a natural seismic event and wind or storm water erosion during construction to a level that is not significant.

4.3.9 Alternative 7 - Corridor 9

Construction of Corridor 9 would not damage or destroy existing landforms found within this alignment. Construction and maintenance activities would require establishing an access road parallel to the utility line. This alternative has the potential to be impacted by geology that may be unstable during a seismic event. Naturally occurring geological events including subsidence, landslides and mudflows, and rupture and ground shaking during earthquakes have the potential to affect construction and operation of Corridor 9.

Corridor 9 has a high potential for soil loss due to wind erosion during construction and a very high potential for soil loss due to rill and sheet flow erosion (Table 4-10). Once construction has concluded, potential loss of soil due to wind or storm water erosion would not likely exceed current undeveloped conditions due to implementation of MinMAIR-12 (addressing dust-control and described in Section 4.1, Air Quality).

Table 4-10
Wind Erodibility Group plus Water Erosion Factor, Alternative 7, Corridor 9

Soil Type Present in Alternative	Wind Erodibility Group	Rill and Sheet Flow K-Factor
Destazo Complex	3	0.28
Randsburg-Rock Outcrop Complex	3	0.32

Incorporation of Mitigations MMGEO-1 through MMGEO-5 and MinMAIR-12 would reduce potential impact from a natural seismic event and wind or storm water erosion during construction to a level that is not significant.

4.3.10 No Action Alternative

Under the No Action Alternative, no utility corridor alternative would be selected. No potential impacts from naturally occurring seismic events would occur. As no construction would occur, no impacts to soils that would result in wind erosion or storm water erosion would occur. No mitigations would be necessary.

4.4 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

4.4.1 Methodology

The thresholds applicable to the analysis of potential impacts on public health and safety from a proposed project under NEPA include reportable quantities of hazardous materials under CERCLA and quantitative exposure thresholds under the Federal Occupational Safety and Health Act (OSHA) and /or California Federal Occupational Safety and Health Act (CalOSHA). To evaluate impacts from existing hazardous waste within the proposed alternatives, a review was conducted of previously completed investigations associated with relevant OUs. The occupational safety and health impacts for the potential effects of construction of any alternative on public safety 40 CFR §1508.27(b)(2) and 32 CFR 989.27 were considered. Based on the undeveloped nature of the existing environments considered for the various alternatives, no impact to public safety would occur. The proposed alternatives were reviewed for their proposed actions during construction related to specific worker health and safety, hazardous materials management and spill prevention.

4.4.2 Significance Criteria

Edwards AFB has been engaged in a wide variety of operations that involve the use, storage and disposal of hazardous materials and hazardous waste. Although legally acceptable at the time,

procedures followed prior to the mid-1970s for managing and disposal of wastes have sometimes resulted in contamination of the environment. The resulting ERP program at Edwards AFB has been undertaken according to standards set forth in state and federal regulations including the following:

- CERCLA that established standards for containing and removing releases of hazardous substances and identifying and cleaning up contaminated sites;
- RCRA that regulates hazardous waste site recovery. RCRA also identifies hazardous wastes as ignitable, corrosive or reactive;
- Superfund Amendments and Reauthorization Act (SARA), which extends the requirements of CERCLA and modifies remediation goals and selection process;
- Toxic Substance Control Act (TOSCA) that designates certain chemicals as “imminently hazardous;”
- Clean Air Act which identifies toxic and hazardous pollutants and substances;
- Clean Water Act, Safe Water Act and Applicable or Relevant and Appropriate Requirements that identifies safe levels of contaminants for water use or reuse;
- California Code of Regulations (CCR) that establishes standards for the management of hazardous waste;
- Federal OSHA which develops and establishes occupational safety and health standards; and
- CalOSHA that identifies California occupational safety and health regulations.

Federal OSHA/CalOSHA regulations would apply for health and safety standards of workers employed during construction of any alternative selected.

4.4.3 Corridor Impacts

Environmental Restoration Program. Construction within Corridors 1, 2, 3, 4, 5, 6 and 9 would not mobilize existing contaminants associated with identified OUs at Edwards AFB in groundwater or soil, or expose workers to contaminated soils or groundwater at levels in excess of those permitted by federal and state law. The risk of exposure to contaminated groundwater by construction workers is unlikely as groundwater, which is at least 20 feet deep and usually much deeper, would not be encountered during construction.

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Construction. Construction within Corridors 1, 2, 3, 4, 5, 6 and 9 would require use of minor amounts of hazardous materials such as fuels and lubricants for construction equipment. The selected construction crew would potentially require the use and storage of hazardous materials. Construction within Corridor 1 would generate minimal hazardous wastes during construction and there would be a limited amount of hazardous materials stored or used on-site during construction. Storage of these materials during construction would be likely in an identified area near the project. Hazardous materials necessary for project implementation that require temporary storage at the construction area would comply with relevant Edwards AFB requirements. The following Mitigation Measure Hazardous (MMHAZ) would reduce potential hazards to workers from hazardous materials or hazardous waste during construction.

MMHAZ: Prior to construction activities, a health and safety plan in compliance with 29 CFR 1910.120 will be prepared and approved by Edwards AFB. The site-specific health and safety plan will address all site-specific safety and environmental hazards that have the potential to be encountered during construction of the alternative, including physical hazards, biological hazards and general safety hazards. Any training required by construction personnel will be identified.

4.4.4 Alternative 8 - No Action Alternative

Under the No-Action Alternative, no impacts related to APs or ERP sites would occur. No hazardous materials would be used and no hazardous waste would be generated to construct a utility corridor. No impacts would occur.

4.5 INFRASTRUCTURE

4.5.1 Methodology

To evaluate project-related impacts to infrastructure from the proposed alternatives, a review was conducted of existing infrastructure including the existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation and communication systems currently in place at Edwards AFB. Effects may occur from physical changes to existing infrastructure

caused by implementing any of the proposed activities. The proposed alternatives were reviewed for their potential impacts to existing infrastructure.

4.5.2 Significance Criteria

The following criteria were used in evaluating significance of impacts on infrastructure.

- The degree to which a utility service or transportation system would have to alter operation practices and personnel requirements;
- The degree to which the increased demands from the proposed alternative would require the development of additional capacity or new facilities;
- The degree to which the increased demands from the proposed alternative would reduce the reliability of utility service or transportation systems or aggravate already existing adverse conditions in the affected region; and
- The degree of damage to underground utilities that could potentially be caused by construction or operation activities and/or the degree of environmental harm or personal injury resulting from that damage.

4.5.3 Alternative 1 - Corridor 1

This alternative would not impact existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation or communication systems currently in place at Edwards AFB. Due to the remoteness of this corridor, no existing infrastructure components would be impacted. This alternative has the potential to enhance delivery of natural gas, water, communication and electrical or power transmission.

Due to proximity of this alternative to the Camacho Reverse Drop Zone (DZ) and the Rowe East and West DZs immediately south of the Camacho DZ at the southern portion of the Base, close coordination with the Base would need to occur to ensure no impacts to any Air Force mission. Underground power transmission, gas, water or fiber would have no impact on the Range Squadron or 412 Test Wing (TW) mission in this location.

Above-ground poles or towers could have potential range impacts depending on height, type utility and proximity to microwave data transmission lines-of-sight. RF interference must also

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be considered for any wireless devices and should, at a minimum, include information on: transmission characteristics, power and frequencies. This utility corridor area also crosses the CATM firing range area which could be a concern for the construction phase of any project.

Implementation of Mitigation Measure Infrastructure (MMINF) would reduce potential impacts to the Air Force mission within Corridor 1 to a level that is not significant.

MMINF: Prior to final design selection, coordination will be required for current and future Air Force mission to ensure that the design does not cause conflict.

4.5.4 Alternative 2 - Corridor 2

This alternative would not impact existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation or communication systems currently in place at Edwards AFB. Due to the remoteness of this corridor, no existing infrastructure components would be impacted. This alternative has the potential to enhance delivery of communication, electrical, power transmission and waterlines.

Above-ground poles or towers associated with this alternative could have potential range impacts depending on height, utility type and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include, at a minimum, information on power, transmission characteristics and frequencies. The Range Squadron routinely transports data (telemetry, voice and video) from Point Mugu, China Lake, Palmdale, Nellis ranges, White Sands Missile Range and Vandenberg AFB, so any RF in proximity to microwave systems would have to be analyzed by the 412 TW Spectrum Office to assess vulnerability.

The Range Squadron manages radar reflector arrays on the Rosamond Dry Lakebed. The south side of the Rosamond Dry Lakebed has a DZ. Dry lakebeds serve as emergency landing areas as well as unimproved landing strip testing sites. Any access or potential impact should be well coordinated with the Operation Support Squadron and Airfield Management. Underground

power transmission, gas, water or fiber would have no impact on the Range Squadron or 412 TW mission in this location.

Implementation of MMINF would reduce potential impacts to the Air Force mission within Corridor 2 to a level that is not significant.

4.5.5 Alternative 3 - Corridor 3

This alternative would not impact existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation or communication systems currently in place at Edwards AFB. Due to the remoteness of this corridor, no existing infrastructure components would be impacted. This alternative has the potential to enhance delivery of underground gas, water, communication, electric or power transmission lines.

Above-ground poles and towers could have potential range impacts depending on height, type utility and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include, at a minimum, information on power, transmission and frequencies. Underground gas, water, communication, electric or power transmission lines would have no impact on the Range Squadron or 412 TW mission in this location.

Implementation of MMINF would reduce potential impacts to the Air Force mission within Corridor 3 to a level that is not significant.

4.5.6 Alternative 4 - Corridor 4

This alternative would not impact existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation or communication systems currently in place at Edwards AFB. Due to the remoteness of this corridor, no existing infrastructure components would be impacted. This alternative has the potential to enhance delivery of buried communication, electric, transmission and water lines.

There may be some future concerns should the AF consider Hawes Field to the east as a potential UAS test area, in which case towers associated with this alternative could cause an intrusion for ingress and egress to and from the east PIRA.

Implementation of MMINF would reduce potential impacts to the Air Force mission within Corridor 4 to a level that is not significant.

4.5.7 Alternative 5 - Corridor 5

This alternative would not impact existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation or communication systems currently in place at Edwards AFB. Due to the remoteness of this corridor, no existing infrastructure components would be impacted. This alternative has the potential to enhance delivery of buried communication, electric, transmission and water lines.

Caution would need to be exercised on the east end from Rich Road to the Four Corners area. Aircraft performing bombing and laser missions on the east range perform the run-in to the targets from the north to south, often at low altitudes. It is imperative that there are no high towers along State Route 58, which could cause a targeting solution problem as well as safety of flight issues.

Implementation of MMINF would reduce potential impacts to the Air Force mission within Corridor 5 to a level that is not significant.

4.5.8 Alternative 6 - Corridor 6

This alternative would not impact existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation or communication systems currently in place at Edwards AFB. Due to the remoteness of this corridor, no existing infrastructure components would be impacted. This alternative has the potential to enhance delivery of buried communication, electric, transmission and water lines.

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Since this corridor is close to or along the same path as existing lines, the Range would not have any issue with this utility corridor area. However, this is in the departure pattern for the main runway and therefore only underground utilities should be considered in this utility corridor area. Underground power transmission, gas, water or fiber would have no impact on the Range Squadron or 412 TW mission in this location.

Above-ground poles or towers could have potential range impacts depending on height, type utility and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include information on power, transmission characteristics and frequencies at a minimum. The Range Squadron transports data (telemetry, voice, and video) from Point Mugu, China Lake, Palmdale, Nellis AFB ranges, White Sands Missile Range and Vandenberg AFB routinely and so any RF in proximity to the microwave systems would have to be analyzed by the 412 TW Spectrum Office to assess vulnerability. This utility corridor area is also in the departure pattern for the main runway and therefore only underground utilities should be considered in this utility corridor.

Implementation of MMINF would reduce potential impacts to the Air Force mission within Corridor 6 to a level that is not significant.

4.5.9 Alternative 7 - Corridor 9

This alternative would not impact existing electrical, natural gas, water, waste water treatment, storm drain systems, transportation or communication systems currently in place at Edwards AFB. Due to the remoteness of this corridor, no existing infrastructure components would be impacted. This alternative has the potential to enhance delivery of buried communication, electric, transmission, and water lines.

Above-ground poles or towers could impact telemetry or RF propagation. No other range operation impacts are known at this time.

Implementation of MMINF would reduce potential impacts to the Air Force mission within Corridor 9 to a level that is not significant.

4.5.10 Alternative 8 - No Action Alternative

Under the No Action Alternative, no utility corridor alternative would be selected. Existing infrastructure at Edwards AFB would not be enhanced nor adversely affected. No potential impacts to Air Force mission from construction of a utility corridor would occur.

4.6 LAND USE

4.6.1 Methodology

Land use impacts are related to the level of consistency with federal plans and policies and local land use plans (such as general plans, zoning ordinances, master plans and other specific land use policies). A significant impact would occur if proposed land uses would not be consistent with relevant federal or local plans and policies. Land use categories for this project follow the Land Improvement Codes conforming to DOD Instruction 4165.14, which established real property inventory requirements (RPIR) in an effort to standardize operational definitions and business rules for all DOD real property assets.

4.6.2 Significance Criteria

A NEPA evaluation must consider the context and intensity of the environmental effects that would be caused by, or result from, the EA Alternatives. There is no standard federal guidance or established threshold pertaining to land use. Therefore, other environmental assessment documents must be reviewed; the criteria described below are used for the selected evaluation.

An alternative would be considered to result in an adverse impact related to land use if it would:

- Conflict with established recreational, educational or scientific uses;
- Conflict with land use goals of the community; or,

- Be associated with the incompatibility of physical development to adjacent existing and planned uses.

4.6.3 Alternative 1 - Corridor 1

There is some concern with this option as it relates to its proximity to the Farm DZ at the south of the Base. This DZ is used on a fairly routine basis in support of both Air Force (AF) test missions as well as Air National Guard sorties. CDS bundles are dropped from C-130 aircraft on this DZ with short scheduling notifications from time to time. Close coordination with Airfield Management and Range would be important to avoid impacts. Implementation of MMINF from Section 4.5 – Infrastructure would ensure that mission related impacts would not occur.

Above-ground poles or towers could have potential range impacts depending on height, type utility and proximately to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include, at a minimum, information on: transmission characteristics, power and frequencies. This utility corridor area also crosses the CATM firing fan range area which is of concern for the construction phase of any project.

Underground power transmission, gas, water or fiber would have no impact on the Range squadron or 412 Test Wing (TW) mission in this location.

4.6.4 Alternative 2 - Corridor 2

Currently, there are existing utilities along this corridor. This option basically expands on the existing path of utilities.

Aboveground poles or towers could have potential range impacts depending on height, utility type and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include information on power, transmission characteristics and frequencies at a minimum. The Range squadron routinely transports data (telemetry, voice and video) from Point Mugu, China Lake, Palmdale, Nellis ranges, White Sands Missile Range and Vandenberg AFB, so any additional RF in proximity to the microwave systems would have to be analyzed by the 412 TW Spectrum Office to assess vulnerability.

The Range squadron manages radar reflector arrays on the Rosamond dry lakebed. The south side of the Rosamond dry lakebed has a DZ. Dry lakebeds serve as emergency landing areas as well as unimproved landing strip testing sites. Any access or potential impact should be well coordinated with the Operation Support Squadron and Airfield Management. Implementation of MMINF from Section 4.5 – Infrastructure would ensure that mission-related impacts would not occur.

Underground power transmission, gas, water or fiber would have no impact on the range squadron or 412 TW mission in this location.

4.6.5 Alternative 3 - Corridor 3

Above-ground poles and towers could have potential range impacts depending on height, type utility and proximately to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include information on power, transmission characteristics and frequencies at a minimum.

Underground gas, water, communication, electric or power transmission lines would have no impact on the range squadron or 412 TW mission in this location.

4.6.6 Alternative 4 - Corridor 4

This utility corridor parallels U.S. Route 395 and remains to the east of the eastern edge of the Precision Impact Range Area (PIRA) and on the east side of U.S. Route 395. Any construction in this area may have unexploded ordnance (UXO). To the west of the utility corridor area is the active range area, where there is a potential for UXO. There may be some future concerns should the AF consider Hawes Field to the east as a potential unmanned aircraft system (UAS) test area, in which case towers could cause an intrusion for ingress and egress to and from the east PIRA.

There are currently no known issues or concerns for range operations with this utility corridor area. However, there may be some future concerns should the AF consider Hawes Field to the

east of the installation as a potential small UAS test area, in which case, any poles or towers could cause an intrusion for ingress and egress to and from the east PIRA. Implementation of MMINF from Section 4.5 – Infrastructure would ensure that mission related impacts would not occur.

4.6.7 Alternative 5 - Corridor 5

Caution would need to be exercised on the east end from Rich Road to the Four Corners area. Aircraft performing bombing and laser missions on the east range perform the run-in to the targets from the north to south often at low altitudes. It is imperative that there are no high towers along State Route 58, which could cause a targeting solution problem as well as safety of flight issues. Implementation of MMINF from Section 4.5 – Infrastructure would ensure that mission related impacts would not occur.

4.6.8 Alternative 6 - Corridor 6

Since this corridor is close to or along the same path as existing lines, the range would not have any issue with this utility corridor area. However, this is in the departure pattern for the main runway and therefore only underground utilities should be considered in this utility corridor area.

Above-ground poles or towers could have potential range impacts depending on height, type utility and proximity to microwave data transmission lines-of-sight. RF interference must also be considered for any wireless devices and should include information on power, transmission characteristics and frequencies at a minimum. The Range squadron transports data (telemetry, voice and video) from Point Mugu, China Lake, Palmdale, Nellis ranges, White Sands Missile Range and Vandenberg AFB routinely and so any additional RF in proximity to the microwave systems would have to be analyzed by the 412 TW Spectrum Office to assess vulnerability. This utility corridor area is also in the departure pattern for the main runway and therefore only underground utilities should be considered in this utility corridor. Implementation of MMINF from Section 4.5 – Infrastructure would ensure that mission-related impacts would not occur.

Underground power transmission, gas, water or fiber would have no impact on the range squadron or 412 TW mission in this location.

4.6.9 Alternative 7 - Corridor 9

Above-ground poles or towers could impact telemetry or RF propagation. No other range operation impacts are known at this time. Implementation of MMINF from Section 4.5 – Infrastructure would ensure that mission-related impacts would not occur.

4.6.10 Alternative 8 - No Action Alternative

Under the No Action Alternative (Alternative 8), the Air Force would not provide for designated utility corridors, but would use existing routes or new, undesignated utility routes. New utility routes would continue to be considered on a case-by-case basis. Each new utility route would require assessment of all land use-related impacts on sensitive receptors and local communities. Land Use resource mitigation measures would need to be assessed based on the dynamics of project level actions.

4.7 NATURAL RESOURCES

The potential direct and indirect impacts on vegetation and animals for the utility corridors are listed in Table 4-11. Direct impacts include the disruption, trampling, or removal of rooted vegetation resulting in a reduction in the total acres of native vegetation and habitat, including desert tortoise critical habitat, or the direct injury or death of individual plants or animals. Indirect impacts occur later in time or are farther removed in distance while still being reasonably foreseeable and related to the project. Potential indirect impacts include introduction of invasive species that compete with native species and can result in habitat degradation. Direct and indirect impacts will be the highest in corridors that do not follow roads or existing utility corridors, such as Corridor 1. All other proposed corridors will have fewer impacts because they follow existing roads and corridors.

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In addition to the avoidance and minimization measures provided in this section, adverse impacts would be eliminated by the incorporation of reasonable and prudent measures as described in the various biological opinions covering activities at the Base, including the basewide Biological Opinion for the Operations and Activities at Edwards Air Force Base, California (8-8-14-F-14; USFWS 2014). All relevant biological opinions for development within the proposed utility corridors are provided in Appendix E.

Table 4-11
Natural Resources Summary of Impact Analysis

Resource of Concern	Potential Impacts
Vegetation Communities	<i>Direct Impacts:</i> acreage of habitats affected <i>Indirect Impacts:</i> introduction of invasive species
Wildlife Communities	<i>Direct Impacts:</i> direct injury or mortality to non-sensitive species; take of a nest protected under the MBTA <i>Indirect Impacts:</i> temporary noise and dust impacts during construction; degradation of localized vegetation and wildlife communities
Sensitive Species - Plants	<i>Direct Impacts:</i> direct removal of individual plants <i>Indirect Impacts:</i> habitat degradation, introduction of non-native invasive species
Sensitive Species – Wildlife	<i>Direct Impacts:</i> direct injury or mortality of individuals <i>Indirect Impacts:</i> temporary noise and dust impacts during construction; degradation of localized vegetation and wildlife communities
Sensitive Habitats	<i>Direct Impacts:</i> direct removal vegetation within critical habitat/DWMA <i>Indirect Impacts:</i> degradation of critical habitat/DWMA, introduction of non-native invasive species into critical habitat

MBTA=Migratory Bird Treaty Act

DWMA=Desert Wildlife Management Area

4.7.1 Vegetation Communities

Vegetation communities directly impacted by the proposed corridors change in composition and amount between each corridor. The vegetation types and acreages of each corridor are further discussed below. Direct impacts to vegetation communities are expected to be less than significant with the incorporation of avoidance and minimization measures in Section 4.7.5. Because they follow existing utility lines and roads, impacts in Corridors 2, 3, 4, 5, 6 and 9 are expected to be less than those generated by Corridor 1 which crosses the designated Los Angeles

County Antelope Valley Significant Ecological Area (SEA) containing biological wetlands and sensitive claypan and playa areas. In addition, although Corridor 3 follows an existing utility line and road, the southern portion of this corridor may have more impacts than other corridors because it traverses a portion of the Piute Ponds Complex and the Los Angeles County Antelope Valley SEA where there are biological wetlands that sustain some sensitive species.

Indirect impacts that may result from the removal of this vegetation include the increased potential for the spread of non-native invasive plant species, as defined by the BLM and California Invasive Plant Council (BLM 1992; Cal-IPC 2006). This impact is not expected to be significant with the incorporation of avoidance and minimization measures in Section 4.7.5.

4.7.2 Wildlife Communities

In each corridor, wildlife communities may be directly affected due to the potential injury and mortality of individuals of local populations of non-sensitive species. None of these effects represents a substantial portion of these wildlife communities either on Edwards AFB or regionally. This impact is expected to be less than significant and requires no avoidance and minimization measures. However, the southern portions of Corridors 1 and 3 traverse more sensitive natural resources (identified in the previous section), the development of which would likely require further analysis at the time that a specific project is proposed.

Direct impacts associated with the take of a nest protected under the MBTA would be considered a significant impact. Avoidance and minimization measures in Section 4.7.5 will be used to reduce these impacts to a less than significant level.

Indirect impacts associated with the construction of each utility corridor could include temporary effects of locally increased noise and dust. Because the Edwards AFB supports activities that create loud noise (sonic booms, rocket tests, etc.) and dust, the temporary increase of these factors in localized areas for construction in utility corridors is expected to be minimal. Impacts generated by all corridors are expected to be less than significant with the incorporation of avoidance and minimization measures described in Section 4.7.5.

Indirect impacts may also result from the localized degradation of vegetation and wildlife communities, not only in areas directly affected, but in edge areas. Because they follow existing utility lines and roads, impacts in Corridors 2, 3, 4, 5, 6 and 9 are expected to be less than those generated by Corridor 1. Impacts generated by all corridors are expected to be less than significant with the incorporation of avoidance and minimization measures described in Section 4.7.5.

A summary of the impacts in each corridor is described in Section 4.7.4.

4.7.3 Sensitive Species and Habitats

Sensitive plants, wildlife and habitats are discussed in Section 3.7 and shown in Figures 3-6 through 3-11. Types of impacts to these resources are discussed here.

Sensitive Species – Plants

Figure 3-7 illustrates where sensitive species on the Base have been found. Direct impacts to individuals and portions of populations of sensitive plants as the result of disturbance may result from construction activities within each corridor, including Alkali mariposa lily and Desert cymopterus along the southern portion of Corridor 1, Alkali mariposa lily and Rosamond eriastrum along the southern portion of Corridor 3 and Barstow woolly sunflower and Desert cymopterus along Corridor 5 and Corridor 9.

Indirect impacts to individuals and populations of sensitive plant that may result from the proposed utility corridors include the increased potential for the spread of non-native invasive plant species that can displace native species. With the exception of the southern portions of Corridors 1 and 3, where it is more likely to encounter sensitive plants, these impacts are not expected to be significant with the incorporation of the avoidance and minimization measures described in Section 4.7.5.

Sensitive Species – Wildlife

Desert Tortoise. Desert tortoise habitat occurs in all utility corridors with recent observations of desert tortoise and highest expected densities occurring in Corridor 4 and Corridor 5. Direct

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impacts to desert tortoise could result from injury or mortality during utility corridor construction due to vehicles crushing individuals or burrows occupied by individuals. Because the desert tortoise is a federally and state listed threatened species, any injury or mortality to a desert tortoise would be considered an adverse impact. This adverse impact would be eliminated by the incorporation of reasonable and prudent measures as described in the Biological Opinion for the Operations and Activities at Edwards Air Force Base, California (8-8-14-F-14; USFWS 2014), as outlined in Section 4.7.5 and provided in Appendix E.

Indirect impacts to desert tortoise could include temporary effects of locally increased noise and dust. Because Edwards AFB currently supports activities that create loud noise (sonic booms, rocket tests, etc.) and dust, the temporary increase of these factors in localized areas for utility corridor construction is expected to be less than significant with the incorporation of avoidance and minimization measures described in Sections 4.7.5.

Indirect impacts from the degradation of burrowing and foraging habitat could occur as a result of the proposed action, not only in areas directly affected, but in edge areas. Due to the small size of these potential effects, this impact is expected to be less than significant with the incorporation of avoidance and minimization measures described in Section 4.7.5.

Additional indirect impacts could occur from providing perches for the common raven, a known predator of juvenile desert tortoise. This impact can be reduced to a less than significant level by the incorporation of reasonable and prudent measures as described in the USFWS Biological Opinion for Operations and Activities at Edwards Air Force Base, California (8-8-14-F-14; USFWS 2014), as outlined in Section 4.7.5.

Mohave Ground Squirrel. Mohave ground squirrel habitat occurs within all corridors, although highest densities are found in the middle and eastern portions of the Base which would affect development primarily in Corridors 1, 4 and 5. Direct impacts include the potential for injury and mortality of Mohave ground squirrels as part of the proposed project. These impacts are considered significant and would be reduced to a less than significant level with the incorporation of avoidance and minimization measures in Section 4.7.5.

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Indirect impacts would include the results from temporary and localized increases in noise and dust. These impacts are expected to be less than significant due to their temporary nature and the presence of existing noise and dust from other activities in the area. These impacts would be less than significant with the incorporation of avoidance and minimization measures described in Section 4.7.5.

Other Sensitive Wildlife Species. Direct impacts include the potential for injury and mortality of other sensitive species (reptile, mammal and bird species listed in Table 3-9) as part of the proposed project. These impacts are not likely to be significant with the incorporation of avoidance and minimization measures in Section 4.7.5.

Indirect impacts would be to potential burrowing and foraging habitat for these species and would result from temporary and localized increases in noise and dust. These impacts would be less than significant with the incorporation of avoidance and minimization measures described in Section 4.7.5.

Sensitive Habitats

Corridor 4 and sections of Corridor 5 occur within designated critical desert tortoise habitat (Fremont-Kramer Recovery Unit). Approximately 1.0 percent of critical habitat and the Desert Wildlife Management Area (DWMA) for the desert tortoise are within Edwards AFB. The proposed corridors would affect up to 930 acres or less than 0.2 percent of the total designated critical habitat. Any adverse modification of critical habitat could be considered a significant impact and require formal consultation. However, the impacts would be reduced to less than significant by following the measures in Section 4.7.5.

The Mohave Ground Squirrel Conservation Area is located on non-military lands adjacent to Edwards AFB, and is managed by the BLM for the protection of habitat for this state-threatened species. None of the utility corridors crosses this conservation area.

The Piute Ponds Complex, located in the southwestern corner of Edwards AFB, consists of lower Amargosa Creek, ponds, marshes, wetland meadows, low sand dunes, small clay pans and

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Rosamond Dry Lake. The southern portion of Corridor 3 traverses the western piece of the Piute Ponds Complex.

4.7.4 Impacts by Alternative

The following section discusses each corridor alternative, the potential impacts caused by each one and the mitigation that will be implemented to reduce potential impacts to less than significant. Table 4-12 shows the special-status species that could be impacted within each of the corridors. Avoidance and minimization of impacts will be achieved by Mitigation Measure Natural (MMNAT) -1through MMNAT-18 will apply to Corridors 1, 2, 3, 4, 5, 6 and 9.

Table 4-12
Potential Impacts to Sensitive Species within each Proposed Corridor

Species	Corridor 1	Corridor 2	Corridor 3	Corridor 4	Corridor 5	Corridor 6	Corridor 9
Alkali Mariposa Lily	X	X	X		X	X	X
American Badger	X	X	X	X	X	X	X
Bank Swallow	X	X	X	X	X	X	X
Barstow Woolly Sunflower	X	X		X	X	X	
Bat species	X	X	X	X	X	X	X
Bell's Sparrow	X	X	X	X	X	X	X
Burrowing Owl	X	X	X	X	X	X	X
California Least Tern	X	X	X		X		
Coves' Cassia					X		
Crowned Onion				X			
Desert Cymopterus	X			X	X		
Desert Tortoise	X	X	X	X	X	X	X
Golden Eagle	X	X	X	X	X	X	X
Lancaster Milkvetch	X						
LeConte's Thrasher	X	X	X	X	X	X	X
Loggerhead Shrike	X	X	X	X	X	X	X
Long-eared Owl			X				
Mohave Ground Squirrel	X	X	X	X	X	X	X
Mojave Spineflower	X						
Mountain Plover	X		X				
Northern Harrier	X	X	X	X	X	X	X
Peregrine Falcons	X	X	X	X	X	X	X

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Species	Corridor 1	Corridor 2	Corridor 3	Corridor 4	Corridor 5	Corridor 6	Corridor 9
Pocket Mouse	X	X	X	X	X	X	X
Prairie Falcons	X	X	X	X	X	X	X
Recurved Larkspur					X		
Redhead	X		X				
Red Rock Poppy	X					X	
Rosamond Eriastrum		X	X				
Sagebrush loeflingia	X	X	X	X	X		
Slender Threadplant					X		
Short-eared Owl			X				
Southern Grasshopper Mouse	X	X	X	X	X	X	X
Swainson's Hawk	X	X	X	X	X	X	X
Tricolored Blackbird			X				
Western Pond Turtle			X				
Western Snowy Plover		X	X				
White Pygmy Poppy		X				X	
Willow Flycatcher	X		X				
Yellow-headed Blackbird	X		X				
Yellow Spiny Cape (golden goodmania)	X						

4.7.4.1 Alternative 1 - Corridor 1

Corridor 1 follows the natural contours of the terrain and does not follow any existing utility corridors or roads. For this reason, impacts would be greater along this corridor because roads would have to be developed and maintained to access new utility lines versus installing the lines in areas that already have utility lines and maintenance roads. Suitable utilities for this corridor include underground gas, water, communication, electric or power transmission lines.

Direct and indirect impacts could occur to vegetation communities which include mesquite woodland (5.0 acres), saltbush scrub (1,612.2 acres) and creosote bush scrub (571.2 acres). Impacts may also occur to wildlife communities, including desert tortoise, Mohave ground squirrel and burrowing owl habitats. The special-status plants alkali mariposa lily, Barstow woolly sunflower, desert cymopterus, Lancaster milkvetch, Mojave spineflower, red rock poppy, sagebrush loeflingia and yellow spiny cape have been mapped within or adjacent to this corridor.

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Wildlife species that may be impacted include the American badger, special status bat species, burrowing owl, desert tortoise, golden eagle, LeConte's thrasher, loggerhead shrike, Mohave ground squirrel, mountain plover, northern harrier and prairie falcon.

Implementation of MMNAT-1 through MMNAT-18 will reduce impacts to a level that is not significant for the northern portion of the corridor. The southern portion of the corridor contains more sensitive species and may require further analysis at the time a specific project is proposed.

4.7.4.2 Alternative 2 - Corridor 2

Corridor 2 has existing utilities. Suitable utilities for this corridor include buried communication, electric, transmission and water lines.

Direct and indirect impacts could occur to vegetation communities which include saltbush scrub (285.9 acres), playa/claypan (145.1 acres) and creosote bush scrub (208.7 acres). Impacts may also occur to wildlife communities, including desert tortoise, Mohave ground squirrel and burrowing owl habitat. The special status plants alkali mariposa lily, Barstow woolly sunflower, Rosamond eriastrum, sagebrush loeflingia and white pygmy poppy have been mapped within or adjacent to this corridor. Wildlife species that may be impacted include the American badger, special status bat species, burrowing owl, desert tortoise, golden eagle, LeConte's thrasher, loggerhead shrike, Mohave ground squirrel, northern harrier, prairie falcon and western snowy plover.

Implementation of MMNAT-1 through MMNAT-18 will reduce impacts to a level that is not significant for this corridor.

4.7.4.3 Alternative 3 - Corridor 3

Suitable utilities for Corridor 3 include underground gas, water, communication, electric or power transmission lines.

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Direct and indirect impacts could occur to vegetation communities which include saltbush scrub (1,231.6 acres) and creosote bush scrub (473.5 acres). Impacts may also occur to wildlife communities, including burrowing owl, desert tortoise and Mohave ground squirrel habitat. The special status plants alkali mariposa lily, Rosamond eriastrum and sagebrush loeflingia have been mapped within or adjacent to this corridor. Wildlife species that may be impacted include the American badger, special status bat species, burrowing owl, desert tortoise, golden eagle, LeConte's thrasher, loggerhead shrike, long-eared owl, Mohave ground squirrel, mountain plover, northern harrier, prairie falcon, short-eared owl, tricolored blackbird and western snowy plover.

Implementation of MMNAT-1 through MMNAT-18 will reduce impacts to a level that is not significant for the northern portion of the corridor. The southern portion of the corridor contains more sensitive species and may require further analysis at the time a specific project is proposed.

4.7.4.4 Alternative 4 - Corridor 4

Suitable utilities for Corridor 4 include buried communication, electric, transmission and water lines.

Direct and indirect impacts could occur to saltbush scrub (2.5 acres), creosote bush scrub (312.5 acres) and Joshua tree woodland (27.6 acres) habitat. Impacts may also occur to wildlife communities. This corridor passes through burrowing owl, desert tortoise and Mohave ground squirrel habitats. The special status plants Barstow woolly sunflower, desert cymopterus and sagebrush loeflingia are within or adjacent to this corridor. Wildlife species that may be impacted include the American badger, special status bat species, burrowing owl, desert tortoise, golden eagle, LeConte's thrasher, loggerhead shrike, Mohave ground squirrel, northern harrier and prairie falcon.

Implementation of MMNAT-1 through MMNAT-18 will reduce impacts to a level that is not significant for this corridor.

4.7.4.5 Alternative 5 - Corridor 5

Corridor 5 follows existing active utility easements. Suitable utilities for this corridor include buried communication, electric, transmission and water lines.

Direct and indirect impacts could occur to vegetation communities which include saltbush scrub (1,093.3 acres), Joshua tree woodland (712.3 acres), playa/claypans (137.0 acres) and creosote bush scrub (705.7 acres). Impacts may also occur to wildlife communities, including burrowing owl, desert tortoise and Mohave ground squirrel habitat. The special status plants alkali mariposa lily, Barstow woolly sunflower, Coves' cassia, desert cymopterus and sagebrush loeblingia occur within or adjacent to this corridor. Wildlife species that may be impacted include the American badger, special status bat species, burrowing owl, desert tortoise, golden eagle, LeConte's thrasher, loggerhead shrike, Mohave ground squirrel, northern harrier and prairie falcon.

Implementation of MMNAT-1 through MMNAT-18 will reduce impacts to a level that is not significant for this corridor.

4.7.4.6 Alternative 6 - Corridor 6

Corridor 6 includes an existing utility corridor. Suitable utilities for this corridor include buried communication, electric, transmission and water lines.

Impacts: Direct and indirect impacts could occur to vegetation communities which includes creosote bush scrub habitat (271.8 acres). Impacts may also occur to wildlife communities, including burrowing owl, desert tortoise and Mohave ground squirrel habitat. The special status plants alkali mariposa lily, Barstow woolly sunflower, red rock poppy and white pygmy poppy have been mapped within or adjacent to this corridor. Wildlife species that may be impacted include the American badger, special status bat species, burrowing owl, desert tortoise, golden eagle, LeConte's thrasher, loggerhead shrike, Mohave ground squirrel, northern harrier and prairie falcon.

Implementation of MMNAT-1 through MMNAT-18 will reduce impacts to a level that is not significant for this corridor.

4.7.4.7 Alternative 7 - Corridor 9

Corridor 9 is close to or along the same path as existing lines, which reduces the impact to natural resources. Suitable utilities for this corridor include buried communication, electric, transmission and water lines.

Direct and indirect impacts could occur to vegetation communities which include saltbush scrub (884.7 acres) and Joshua tree woodland (215.9 acres). Impacts may also occur to wildlife communities, including burrowing owl, desert tortoise and Mohave ground squirrel habitat. The special status plant alkali mariposa lily has been mapped adjacent to this corridor. Wildlife species that may be impacted include the American badger, special status bat species, burrowing owl, desert tortoise, golden eagle, LeConte's thrasher, loggerhead shrike, Mohave ground squirrel, northern harrier and prairie falcon.

Implementation of MMNAT-1 through MMNAT-18 will reduce impacts to a level that is not significant for this corridor.

4.7.4.8 Alternative 8 - No Action Alternative

Under Alternative 8, there would be no action and, therefore, no natural resources would be affected by the proposed undertaking. No mitigation for natural resources would be warranted.

4.7.5 Avoidance and Mitigation Measures

The following measures will be employed in each utility corridor to reduce any potential significant impacts to natural resources to less than significant levels, and as best management practices. These measures include those in the USFWS Biological Opinion for Operations and Activities at Edwards Air Force Base, California (8-8-14-F-14; USFWS, 2014), additional biological opinions (see Appendix E) and the INRMP (Edwards Air Force Base, 2015).

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MMNAT-1: Provide a worker environmental awareness program (WEAP) to all individuals that will be working on the project in the field (USFWS, 2014; EAFB, 2008). This program may consist of videos, brochures and briefings and will include information on:

1. The role of biological monitors and authority of monitors to stop work;
2. Locally known invasive weeds and limiting weed spread and colonization;
3. The MBTA and nest-avoidance measures;
4. Special status species present or potentially present within the corridors;
5. Desert tortoise history in the project area, desert tortoise ecology, threats to the species and the protection measures described here and in the BO (USFWS 2014);
6. Mohave ground squirrel history in the project area, ecology and the avoidance and minimization measures described in this section for this species;
7. Other sensitive species that may be found throughout the construction of the project and the avoidance and minimization measures described in this section for these species; and
8. Locations and designations of critical habitat and DWMA in the project area.

All personnel will sign a statement that they have received, understand and will follow the regulations and protection measures presented in the program. Copies of signed statements will be on file at the Environmental Management Office. This measure fulfills or exceeds the requirements in the BO (USFWS, 2014).

MMNAT-2: Wash all vehicles and equipment prior to bringing them on site if they have been used in areas off-base.

MMNAT-3: All project-related construction activities will be conducted during daylight hours. If any activities are to disturb native habitat between dusk and dawn, they shall be limited to

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areas which have already been cleared of desert tortoises and other sensitive species by biological monitors and enclosed by a fence to exclude desert tortoises (USFWS, 2014).

MMNAT-4: Ensure that qualified biological monitors are present during all construction-related activities to confirm avoidance and minimization of all biological resources is being conducted to the maximum extent practicable. These measures include:

1. Biological monitors will be available during site development activities which may result in injury or mortality of desert tortoises. The designated biologist will determine which activities require biological monitoring.
2. Any desert tortoises found during construction-related activities will be relocated to nearby safe areas, not more than 100 meters from the point of capture. When the area is considered safe, desert tortoises will be returned to their point of capture.
3. When handling desert tortoises, the qualified biologists and environmental monitors will follow the procedures described in *Guidelines for Handling Desert Tortoises During Construction Projects* (Desert Tortoise Council 1996).
4. Only qualified biologists, as defined by the USFWS and the designated biologist will conduct preconstruction surveys for desert tortoises and remove animals from work areas to nearby suitable habitat.
5. The proponent shall employ the services of a qualified biologist if the proponent plans to install, repair, maintain or remove a utility during nesting season (1 February – 30 August).

MMNAT-5: Limit disturbance areas during construction to the minimum needed to perform activities. During construction, activity areas will be clearly fenced, marked and flagged at the outer boundaries to define the limits of work areas. Installation of fencing along roadways will be implemented in areas deemed hazardous to desert tortoise to prevent injury or mortality. All workers will be instructed to confine their activities to the marked areas (USFWS, 2014).

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MMNAT-6: Laydown, parking and staging areas will be restricted to previously disturbed areas to the maximum extent practicable (USFWS, 2014).

MMNAT-7: Vehicles will, to the maximum extent practicable, remain on established roads. Equipment and vehicle operators will be alert for desert tortoises and other wildlife in and along access routes. When traveling off-road, speed limits will not exceed 5 miles per hour and shrubs will be avoided as much as possible. Speed limits on dirt roads within the project area shall be less than 20 mph unless otherwise posted.

MMNAT-8: All personnel on the site will check under parked vehicles and equipment for desert tortoises and other wildlife species before moving vehicles. If a desert tortoise is discovered under a parked vehicle, an authorized biologist shall relocate the animal to a nearby, safe location. The authorized biologist shall use his or her best professional judgment to ensure that desert tortoises moved in this manner are not subjected to temperature extremes which could result in injury or death. Alternatively, the vehicle shall be left in place until the desert tortoise moves of its own volition (USFWS, 2014).

MMNAT-9: All trash will be placed in closed and covered containers for proper disposal to reduce its attractiveness to desert tortoise predators (e.g., coyotes and common ravens). The containers must not be able to be opened by predators and must be emptied regularly to ensure adequate capacity is maintained. Water tanks and trucks will be maintained in good working order and free of leaks so common ravens and other predators will not be attracted to standing water (USFWS, 2014).

MMNAT-10: If common raven presence increases locally as a result of the proposed project, perch deterrents will be placed on structures that are supporting perching (USFWS, 2014).

MMNAT-11: Pre-construction surveys will be conducted by the biological monitor immediately in front of all equipment. During these surveys, the biological monitor will identify the following resources and complete the following activities:

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1. Identify active nests that fall under the MBTA and flag an avoidance area for each nest at a minimum of 50 meters from the nest.
2. Identify rare plant species occurrence. Avoid rare plant species locations whenever possible.
3. Identify potential desert tortoise burrows and flag for avoidance, if possible, at a minimum distance of 10 meters to avoid any activities affecting the burrow or any individuals underground. If avoidance of desert tortoise burrows is not possible, individual burrows will be scoped to determine if there is an animal underground. If no tortoise is using the burrow, the burrow will be excavated according to the *Guidelines for Handling Desert Tortoises During Construction Projects* (Desert Tortoise Council, 1996).
4. Avoid the desert tortoise. However, if avoidance is not possible, individuals found above-ground within the project area will be temporarily moved out of harm's way by an authorized biologist according to the *Guidelines for Handling Desert Tortoises During Construction Projects* (Desert Tortoise Council 1996). Desert tortoises shall not be released more than 100 meters from the point of capture (USFWS, 2014).

MMNAT-12: All project personnel shall immediately report sightings of desert tortoises and other sensitive species and their burrows found within the project area to the biological monitor.

MMNAT-13: Above ground utilities lines will be placed at least 18 inches aboveground when they traverse desert tortoise habitat. If at any time after installation, the height of the gas pipes above the ground has been reduced to less than 18 inches, the pipelines will either be raised or the materials causing the reduction will be removed (USFWS, 2014).

MMNAT-14: Underground utilities will be located adjacent to or within previously disturbed areas when possible (USFWS 2014).

MMNAT-15: Lands above utilities will be re-vegetated unless a road needs to be constructed and maintained for access and maintenance activities. Roads needed for utility maintenance will be concentrated in previously established corridors when possible (USFWS, 2014).

MMNAT-16: Habitat restoration in the form of re-vegetation will be implemented as required.

1. Habitat restoration for ground disturbance will include techniques to control soil erosion that have been proven successful in the desert environment and will include the use of native plants and seeds to mimic natural biodiversity
2. Habitat restoration activities will be conducted in accordance with the Edwards Air Force Base Revegetation Guide prepared by Edwards AFB (U.S. Air Force, 1994; U.S. Air Force, 2012c)
3. Monitoring success of efforts will be implemented for a longer period than the standard 5-year monitoring period due to slow recovery rates of re-vegetation areas in the desert.

MMNAT-17: Open excavations will be checked three times a day and authorized personnel will remove any trapped animals. Open excavations will be covered, backfilled or fenced at the end of each work day unless other methods of excluding desert tortoises are employed. At the ends of a ditch or trench, a 3:1 slope will be created to allow wildlife to exit should they become trapped (USFWS, 2014).

MMNAT-18: Any pipes left or stored on the ground in the project area will be capped on both ends to prevent entry by desert tortoises or other wildlife (USFWS, 2014).

4.8 NOISE

4.8.1 Methodology

Noise may be generated from a point source, such as a piece of construction equipment or from a line source, such as a road containing moving vehicles. Because noise spreads in an ever-widening pattern, the given amount of noise reaching an object, such as an eardrum, is reduced

with distance from the source. For development of a utility corridor, the primary source of noise would be during construction. These impacts would be temporary. Operational noise would be negligible, as it would be limited to the occasional use of equipment and vehicles for maintenance purposes. Noise impacts would be significant if they affect sensitive receptors, such as residences, schools and hospitals. Most of the proposed corridors are not near any sensitive receptors. Some portions of Corridors 1, 3 and 5 cross closer to these receptors as described below.

4.8.2 Significance Criteria

A project would normally have a significant effect if it were to substantially increase the ambient noise levels for adjoining areas or if it conflicts with adopted plans and goals of the community where it is located. In general, temporary construction activities that are over one-quarter mile from a sensitive receptor would not result in significant impacts.

To protect the public health and welfare with an adequate margin of safety, the USEPA guidelines recommend a $L_{eq}(24)$ of 70 dBA as the noise threshold for hearing loss prevention (USEPA, 1974). The OSHA establishes workplace exposure guidelines that require hearing protection for people in close proximity to the noise levels, depending on exposure time, from 90 dBA to 115 dBA (OSHA, 2015).

4.8.3 Alternatives 1 through 7

The level of noise resulting from construction activities is presumed to be similar for each of the Alternatives 1 through 7 of the Proposed Action where the source of noise would originate from on- and off-road motor vehicles, including construction staff vehicles, construction tractors and equipment and delivery trucks. Therefore, each of these alternatives would have relatively uniform noise impacts and mitigation measures.

Noise impacts resulting from the operation of construction equipment would be short-term for Alternatives 1 through 7; no long-term impacts are anticipated. The operation of construction

equipment during excavation/earth moving would produce elevated noise levels in the immediate vicinity of the site. These noise levels and their impacts on sensitive receptors would be mostly mitigated by the gap between the construction site and receptors.

While, most of the Proposed Action alternatives are separated from sensitive receptors and communities, Alternatives 1, 3 and 5 have segments closest to sensitive receptors and communities. Alternative 5 has segments with sensitive receptors where the closest receptor is at approximately 3,000 feet (i.e., Muroc Unified School District) and may not have noise impacts on receptors. Alternative 1 has a segment approximately 0.9 miles (about 4,800 feet) from the west end of the housing area. It is unlikely that noise mitigation would be needed during construction due to this distance. Alternative 3, along the west side of the Base, passes near the community of Rosamond although it is approximately 0.9 miles (about 4,800 feet) from the nearest residence.

The following noise mitigation measure (MMNOZ) is proposed for these alternatives.

MMNOZ: Noise levels could be reduced by limiting construction noise to daytime (e.g., 7:00 a.m. to 7:00 p.m.) and shortening work periods. In addition, noise levels would be minimized by keeping the construction activities at a distance from residential areas. Where noise may be a concern during construction, monitoring at the receptor location may be considered to minimize impact to sensitive receptors and communities. Noise levels would return to background levels once construction activities cease.

4.8.4 Alternative 8 - No Action Alternative

Under the No Action Alternative (Alternative 8), the Air Force would not provide for designated utility corridors, but would use existing routes or new, undesignated utility routes. New utility routes would continue to be considered on a case-by-case basis. Each new utility route would require assessment of all noise-related impacts on sensitive receptors and local communities. Noise mitigation measures would need to be assessed based on the dynamics of project-level actions.

4.9 SOCIOECONOMICS

4.9.1 Methodology

When conducted in close proximity to residences and businesses, construction must be controlled as needed and monitored to avoid impacts on surrounding communities. Employment for construction and installation activities would likely be derived from local communities and from within Kern, Los Angeles and San Bernardino counties.

4.9.2 Significance Criteria

A socioeconomic impact assessment is designed to assist communities in making decisions that promote long-term sustainability, including economic prosperity, a healthy community and social well-being. One aspect of this challenge is deciding how much and what types of new development the community can accommodate, without compromising the day-to-day quality of life for residents.

Assessing socioeconomic impacts requires both quantitative and qualitative measurements of the impact of a proposed development. For example, a proposed development may increase employment in the community and create demand for more affordable housing. Both effects are easily quantifiable. Assessing community perceptions about development requires the use of methods capable of revealing often complex and unpredictable community values.

Socioeconomic impacts would be considered significant if long-term employment rates or Edwards AFB's annual total economic impact to the region decreased. Socioeconomic impacts would also be considered significant if they substantially altered the location and distribution of the population within the region of influence; caused the population to exceed historic growth rates; decreased jobs so as to substantially raise the regional unemployment rates or reduce income generation; substantially affected the local housing market and vacancy rates; or resulted in the need for new social services and support facilities.

4.9.3 Alternatives 1 through 7

Socioeconomic effects resulting from construction and installation activities are presumed to be similar for each of Alternatives 1 through 7 of the Proposed Action, including demographics, housing, schooling, employment, income levels, public services and aesthetic values. Therefore, each of these alternatives would have relatively uniform socioeconomic impacts.

Socioeconomic impacts resulting from the operation of construction equipment and installation activities would be short-term for Alternatives 1 through 7; no long-term impacts are anticipated. Construction and installation activities for each of the Alternatives 1 through 7 would result in a temporary increase in local employment and the use of local goods and services, hence, benefitting the local economy. Negative consequences related to aesthetic quality, noise and nuisances would be only temporary, and upon project completion, the benefits resulting from project activities would augment community perceptions and enhance the well-being of the community. However, no significant impacts would occur and no mitigation is warranted.

Most of the Proposed Action alternatives are separated from sensitive receptors and communities. As discussed in Section 4.8, Noise, only Alternatives 1, 3 and 5 have segments closest to sensitive receptors and communities. As discussed above, none of the sensitive receptors are close enough to the utility corridors to result in any negative impacts.

4.9.4 Alternative 8 - No Action Alternative

Under the No Action Alternative (Alternative 8), the Air Force would not provide for designated utility corridors, but would use existing routes or new, undesignated utility routes. New utility routes would continue to be considered on a case-by-case basis. Each new utility route would require assessment of all socioeconomic-related impacts on sensitive receptors and local communities. Socioeconomic mitigation measures would need to be assessed based on the dynamics of project-level actions.

4.10 WATER RESOURCES

4.10.1 Methodology

Development of the alternatives would not result in an increase in groundwater withdrawal at Edwards AFB. Therefore, none of the selected alternatives would substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. As a result, further analysis of groundwater resources is not necessary.

To evaluate project-related impacts to surface water resources from the proposed alternatives, a review was conducted of previously completed investigations associated with the playa lake beds and surface water. The proposed alternatives were reviewed for their actions related to potential impacts to water quality due to ephemeral drainages as well as potential flooding hazards.

The Finding of No Practicable Alternative (FONPA) for this EA considered all activities proposed within a delineated 100-year flood hazard area. This applies to Corridor 2 which crosses Rosamond Dry Lake, and has been designated as a 100-year floodplain.

4.10.2 Significance Criteria

The evaluation of potential impacts on water resources is based on the Alternative's potential to affect water quality, surface water runoff volumes and drainage patterns and flood hazards. Any selected alternative would have a significant impact on hydrology and water resources if it would:

- Violate any water quality standards or waste discharge requirements;
- Substantially alter the existing drainage pattern or hydrology of the site or area, including through the alteration of the course of a wash, in a manner that would result in substantial erosion or siltation on- or off-site;
- Substantially increase the potential for flooding or the amount of damage that could result from flooding; or
- Create or contribute runoff water which would exceed the capacity of existing or planned

storm water drainage systems or provide substantial additional sources of polluted runoff. The proposed Project could potentially cause a limited flood impact if:

- Structures which would impede or redirect flood flows within a 100-year flood hazard area; or
- It would expose people or structures to a significant risk of loss, injury or death involving flooding including flooding as a result of the failure of a levee or dam, inundation by seiche, tsunami or mudflow.

4.10.3 Alternative 1 - Corridor 1

Impacts

Playa Lake Bed. The southern portion of Corridor 1, Alternative 1 would cross a portion of the playa complex associated with Buckhorn Dry Lake. Buckhorn Dry Lake has not been delineated as a 100-year floodplain. However, the southern portion of Corridor 1 is within a flood prone area according to a 2002 United States Geological Survey (USGS) geomorphological assessment of flood hazards on Edwards AFB. No increase in flooding hazards or impacts associated with flooding for this portion of the alternative are expected.

Surface Water. A small portion the northern section of Corridor 1 would cross Mojave Creek that has not been delineated as a 100-year flood plain; however, a future study may result in delineation, and construction of this portion of the corridor within Mojave Creek has the potential for increasing down-stream flooding hazards. As unnamed ephemeral drainages appear to be bisected by this alternative, construction of Corridor 1 has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area.

Mitigation

The following hydrology mitigation measures (MMHYD) would reduce potential impacts from the project for flooding hazards and water quality due to erosion.

MMHYD 1: If construction within a floodplain is required, appropriate mitigations for reducing flooding hazards as identified by a qualified, state of California registered geologist or engineer would be identified and incorporated into the final design of the selected alternative. This may include prohibiting construction during the rainy season and including design features in the project to minimize flooding impacts to the project.

MMHYD-2: The selected alternative may require a SWPPP in support of a NPDES permit in connection with construction activities. Implementation of a SWPPP would ensure protection of downstream water quality, as sediment erosion would be controlled and sediment movement from the proposed alternative during construction would be reduced.

4.10.4 Alternative 2 - Corridor 2

Impacts

Playa Lake Bed. The western portion of Corridor 2 would cross the northern portion of Rosamond Dry Lake within the current easement of Rosamond Boulevard. Rosamond Dry Lake has been identified as a 100-year floodplain. This alternative has the potential for increasing flooding hazards in the area, and for potentially affecting the integrity of the project itself. The FONPA associated with this EA provides an explanation of why this corridor cannot be realigned to avoid the floodplain.

Surface Water. Unnamed ephemeral drainages appear to be bisected by this alternative. Construction of Corridor 2 has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area.

Mitigation

Incorporation of MMHYD-1 and MMHYD-2 would reduce potential impact from flooding hazards and from poor water quality due to erosion, respectively.

4.10.5 Alternative 3 - Corridor 3

Impacts

Playa Lake Bed. This utility corridor would not bisect any of the dry lake beds or other designated 100-year floodplains at Edwards AFB. The southern portion of Corridor 3 is within a floodprone area according to a 2002 United States Geological Survey (USGS) geomorphological assessment of flood hazards on Edwards AFB.

Surface Water. As unnamed ephemeral drainages appear to be bisected by this alternative, construction of Corridor 3 has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area.

Mitigation

Incorporation of MMHYD-2 would reduce potential impacts to water quality due to erosion.

4.10.6 Alternative 4 - Corridor 4

Impacts

Playa Lake Bed. This utility corridor does not bisect any of the dry lake beds or other designated 100-year floodplains at Edwards AFB. No increase in flooding hazards would occur. Unnamed ephemeral drainages appear to be bisected by this alternative. Construction of Corridor 4 has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area.

Mitigation

Incorporation of MMHYD-2 would reduce potential impacts to water quality due to erosion.

4.10.7 Alternative 5 – Corridor 5

Impacts

Playa Lake Bed. This utility corridor does not bisect any of the dry lake beds or other designated 100-year floodplains at Edwards AFB. No increase in flooding hazards would occur.

Surface Water. Unnamed ephemeral drainages appear to be bisected by this alternative. Construction of Corridor 5 has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area.

Mitigation

Incorporation of MMHYD-2 would reduce potential impact from flooding hazards and from poor water quality due to erosion.

4.10.8 Alternative 6 - Corridor 6

Impacts

Playa Lake Bed. This utility corridor does not bisect any of the dry lake beds or other designated 100-year floodplains at Edwards AFB. No increase in flooding hazards would occur.

Surface Water. Unnamed ephemeral drainages appear to be bisected by this alternative. Construction of Corridor 6 has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area.

Mitigation

Incorporation of MMHYD-2 would reduce potential impacts to water quality due to erosion.

4.10.9 Alternative 7 - Corridor 9

Impacts

Playa Lake Bed. This utility corridor does not bisect any of the dry lake beds or other designated 100-year floodplains at Edwards AFB. No increase in flooding hazards would occur.

Surface Water. A small portion of the northern section Corridor 9 would cross Mojave Creek that has not been identified delineated as a 100-year flood plain; however, a future study may result in delineation and construction of this portion of the corridor within Mojave Creek has the potential for increasing down-stream flooding hazards.

Unnamed ephemeral drainages appear to be bisected by this alternative. Construction of Corridor 9 has the potential for increasing sediment due to storm water movement of disturbed sediments within the construction area.

Mitigation

Incorporation of MMHYD-1 and MMHYD-2 would reduce potential impact from flooding hazards and from poor water quality due to erosion, respectively.

4.10.10 Alternative 8 - No-Action Alternative

Under the No-Action Alternative, no alternative would be selected for construction. No increases to flooding hazards from construction within a 100-year floodplain would occur. No potential increases in uncontrolled sediments introduced into the numerous unnamed drainages would occur. No mitigations would be necessary.

4.11 CUMULATIVE IMPACTS

Air quality impacts would be considered significant if project emissions, including dust, were to increase ambient pollutant concentrations from below the NAAQS or CAAQS to above these

standards or if they were to contribute measurably to an existing or projected ambient air quality standard violation.

4.11.1 Air Quality and Greenhouse Gases

The Proposed Action would generate short-term temporary construction-related air and GHG emissions. Table 4-1 shows that the Proposed Action does not exceed established thresholds and would have no significant impact by itself. Implementation of MMINF and MMAIR-12 would ensure that significant impacts would not occur. The temporary nature of the project impacts, as well as the limited amount of emissions and the distance from sensitive receptors and other proposed projects would ensure that no significant cumulative impacts would occur.

Air Quality

The federal CAA requires states to develop plans, known as State Implementation Plans (SIPs), stating how they will attain or maintain NAAQS. SIPs are a compilation of new and previously approved plans, programs, district rules, state regulations and federal controls. States and local air quality management agencies prepare SIPs for approval by the USEPA.

The Kern County Air Pollution Control District's California Clean Air Act Ozone Air Quality Attainment Plan (Plan) was approved by CARB on February 18, 1993. To comply with section 40924(a) of the California Health and Safety Code EKAPCD prepared the Annual California Clean Air Act Ozone Air Quality Attainment Plan Implementation Progress Report Number 9 in 2005.

The Proposed Action is consistent with the Edwards AFB Installation Development Plan and, therefore, is presumed to be consistent with the Kern County Air Pollution Control District's California Clean Air Act Ozone Air Quality Attainment Plan. Local governments maintain the authority to determine the types of land use that are allowed within their jurisdiction. For example, in city General Plans, each parcel of land within that city is given a land use designation (i.e., residential, industrial, etc.). Land use types that do not fall within the General

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Plan designation are inconsistent with the General Plan and are not allowed. A proposed project that is inconsistent with a local General Plan is also inconsistent with the applicable clean air plan. A proposed action would be inconsistent with a General Plan if it resulted in a land use re-designation, thereby requiring a general plan amendment. Pursuing a land use designation change has various impacts in air emissions and requires a general plan amendment.

The Proposed Action would be inconsistent with the General Plan if its operation were to result in a growth in population, emission source, or a change in general plan designation. Since none of these criteria is impacted, it is not anticipated that the project will have cumulative impacts.

A summary of emission inventories for the MDAB and the Kern County portion of the MDAB and a comparison of emissions from the Proposed Action against the emission inventories are provided in Tables 4-13 through 4-15 as prescribed in the Kern County's *Guidelines for Preparing an Air Quality Assessment for Use in Environmental Impact Reports* to address cumulative impact assessment (County of Kern, 2006). The data presented in Table 4-15 show that the emissions resulting from the proposed project are significantly less than projected emissions for the MDAB and the Kern County portion of the MDAB.

Table 4-13
Emissions Inventory Mojave Desert Air Basin 2020 Projection (Tons per year)

	ROG	NOx	PM10
Total Emissions	41,498	57,429	59,475
Percent Stationary Sources	21.4	52.9	26.2
Percent Area-wide Sources	13.4	1.1	58.8
Percent Mobile Sources	23.3	45.3	5.2
Percent Natural Sources	41.9	0.7	9.8
Total Stationary Sources Emissions	8,883	30,376	15,583
Total Area-wide Sources Emissions	5,580	641	34,970
Total Mobile Sources Emissions	9,662	26,019	3,080
Total Natural Sources Emissions	17,373	393	5,841

Source: CARB 2013

Notes:

NOx nitrogen oxides

PM₁₀ particulate matter less than 10 microns in diameter

ROG reactive organic gases (this term is interchangeable with volatile organic compounds [VOCs])

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Table 4-14
Emissions Inventory Mojave Desert Air Basin
Kern County Portion 2020 Estimate Projection

	ROG	NOx	PM10
Total Emissions	14,757	12,632	9,819
Percent Stationary Sources	3.2	60.7	17.8
Percent Area-wide Sources	4.0	0.8	29.3
Percent Mobile Sources	16.4	37.7	12.7
Percent Natural Sources	76.4	0.8	40.2
Total Stationary Sources Emissions	477	7,666	1,747
Total Area-wide Sources Emissions	591	103	2,877
Total Mobile Sources Emissions	2,418	4,757	1,245
Total Natural Sources Emissions	11,271	106	3,950

Source: CARB 2013

Notes:

NOx nitrogen oxides

PM₁₀ particulate matter less than 10 microns in diameter

ROG reactive organic gases (this term is interchangeable with volatile organic compounds [VOCs])

Table 4-15
Proposed Action Emissions and Emission Inventories for
MDAB and Kern County Portion 2020 Estimate Projection

	ROG	NOx	PM10
Proposed Action	0.25	35.59	1.21
Kern County	14,757	12,632	9,819
Mojave Desert Air Basin	41,498	57,429	59,475
Proposed Action Percent of Kern County	0.0017	0.28	0.0123
Proposed Action Percent of MDAB	0.0006	0.06	0.0020

Source: CARB 2013

Notes:

NOx nitrogen oxides

PM₁₀ particulate matter less than 10 microns in diameter

ROG reactive organic gases (this term is interchangeable with volatile organic compounds [VOCs])

Greenhouse Gases

The Proposed Project annual emissions would be short-term, construction-related impacts, generated primarily from mobile sources and would be significantly below established thresholds (Table 4-16) and, therefore, would have a less than significant impact.

Past, Present and Future Projects

Implementation of the Proposed Action is anticipated to require extensive planning for multiple projects that may take place at separate locations and different timeframes. Compiling a list of

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projects is required at both the project level and at the programmatic level. At the project level, the evaluation of localized impacts would be required in greater detail given that each specific project will have known requirements. At the programmatic level, a preliminary list of potential projects is provided in Table 4-16. However, any utility corridor project and potential cumulative project identified here may not be developed at the same time.

Table 4-16
List of Potential Projects with Cumulative Air Quality Impacts

Project Name	Description
Long Range Strategic Bomber	Requires construction of one building, renovation of four hangars, demolition and replacement of entire aircraft parking ramp area and pad 19 and demolition of buildings 1862, 1864A and 1866; will occur in approximately Fiscal Year 16
F-22 Relocation	Requires demolition of building 1636 and construction of new
Project Name	Description
F-22 Relocation	replacement and renovation 1630 hangar/offices and multiple small buildings in the complex; will occur in approximately Fiscal Year 16
Caltrans Kramer Junction Bypass	Construction includes overpass/on & off ramps and new Hwy 58 4-lane divided expressway approximately 13 miles long; will occur in approximately Jun 2019
Caltrans Median buffer	Caltrans Hwy 395 median buffer starting just south of Kramer Junction and continuing south for approximately 10 miles; will occur in approximately FY18

4.11.2 Cultural Resources

Past, Present and Future Projects

Cumulative impacts of the proposed undertaking on known cultural resources are taken into consideration with past, present and future projects within the Antelope Valley; these include projects proposed for Edwards AFB, as well as surrounding counties (Kern, San Bernardino and Los Angeles).

Among the greatest cumulative impacts to cultural resources are the following projects:

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- Federal Energy Regulatory Commission's proposed Kern River Gas Transmission Expansion Project included the 2011 construction of a 715.8-mile gas pipeline extending through California, Utah, Nevada and Wyoming. The project area extends through the proposed Utility Corridor study area. Multiple cultural resources were encountered through this project.
- California Department of Transportation (CALTRANS) Projects: Proposed Kramer Junction Bypass; State Route 58 Hinkley Expressway Project; median buffer along U.S. Route 395; and the proposed U.S. Route 395 Upgrades. Also, the National Telecommunication and Information Administration and California Public Utilities Commission proposes the installation of 583 miles of underground fiber optic cables within CALTRANS right-of-way easements along State Route 58. These projects propose to widen or establish new transportation routes in the general area. Multiple cultural resources may be encountered through these combined road and fiber optic projects.
- Large scale solar projects have been planned within the Antelope Valley including: Boulevard Associates, LLC, Solar Plant; High Desert Power Project; Kramer Junction Solar Electric Generating System and Lightsource Renewables, LLC, and Solar Plant. These projects encompass vast amounts of acreage and have the greatest potential for cumulative impacts to cultural resources.

Moderate cumulative impacts to cultural resources are identified with the following project:

- The proposed PG&E Hinkley Groundwater Remediation Project has the ability to impact cultural resources in areas where groundwater contamination has occurred.

Minor cumulative impacts to cultural resources are the following projects:

- At Edwards AFB, proposed projects include demolition and new construction in support of the CTF buildout and F-22 Relocation: Both projects are estimated as occurring in FY16. It is unknown whether or not these structures proposed for demolition are over 50 years of age; if the buildings are over 50 years in age, they should be inventoried and evaluated as cultural

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resources. The proposed new construction area may require additional survey for subsurface archaeological resources, which may relate to the former military activities in addition to the contexts identified in Section 3.2.3. Any adverse effects to historic properties would need to be mitigated prior to the demolition and construction. In terms of cumulative affect in comparison to the proposed Utility Corridor project, the proposed impacts associated with the USAF project for the CTF buildout and F-22 Relocation appear to be minor.

- Miscellaneous Cellular Projects: AT&T Cellular Tower (San Bernardino County); and Metro PCS Cellular Tower (Boron, Kern County)
- Other Minor Impacts: Office Space for Tire Service Business; Pilot Travel Addition or Recyclable Collection at 12033 Gardiner Street in Boron.

Areas with Potential Cumulative Impacts

As noted above, impacts on cultural resources and paleontological resources associated with a utility corridor could result from ground-disturbing activities such as project-related excavation, grading, trenching, vegetation clearance, the operation of heavy equipment or other surface and sub-surface disturbance that could damage or destroy surficial or buried cultural resources including prehistoric or historic period archaeological resources, paleontological resources or human burials.

Most of the cultural resources identified within the APE (n=255 sites) have not been formally evaluated for eligibility for listing in the NRHP (See Table 4-17). Selecting to develop or construct any of the proposed options would require formal significance evaluation of those resources that have not yet been evaluated, if they would be adversely affected by the proposed undertaking. If adverse effects to the resources determined eligible for the NRHP cannot be avoided, then appropriate, site specific mitigation must occur prior to developing a selected corridor option. Construction monitoring may be required at all sites affected by the proposed

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undertaking. Further, there is greater potential of discovering sites during construction in areas with more high complexity sites than in areas with few or no high complexity sites.

Table 4-17
Summary of Environmental Impacts with Regard to Cultural Resources Associated with the Proposed Action

Corridor	Total Number of Cultural Resources	NRHP-Eligible (Sites=n)	Not Eligible (Sites=n)	Not Evaluated (Sites=n)	Archaeological Sites of Concern
1	65	11	14	40	EAFB-79, EAFB-90, EAFB-100, EAFB-105, EAFB-108, EAFB-199, EAFB-206, EAFB-423, EAFB-854, EAFB-1000, EAFB-3051
2	22	2	2	18	EAFB-36, EAFB-100
3	83	9	16	58	EAFB-7, EAFB-8, EAFB-31, EAFB-34, EAFB-238, EAFB-835, EAFB-951, EAFB-1178, EAFB-1717, EAFB-3010, EAFB-3302, EAFB-4188, EAFB-6083
4	11	0	1	10	EAFB-588
5	106	2	15	89	EAFB-216, EAFB-579, EAFB-596
6	5	0	3	2	EAFB-6123
9	53	2	12	39	EAFB-562, EAFB-845
Total	345	25	61	255	EAFB-7, EAFB-8, EAFB-31, EAFB-34, EAFB-36, EAFB-79, EAFB-90, EAFB-100, EAFB-105, EAFB-108, EAFB-199, EAFB-206, EAFB-216, EAFB-238, EAFB-423, EAFB-562, EAFB-579, EAFB-588, EAFB-596, EAFB-835, EAFB-845, EAFB-854, EAFB-951, EAFB-1000, EAFB-1178, EAFB-3010, EAFB-3051, EAFB-3302, EAFB-4188, EAFB-6083, EAFB-6123

4.11.3 Geology and Soils

Past, Present and Future Projects

Cumulative impacts of the proposed undertaking on geology and soils resources are taken into consideration with past, present and future projects within the Antelope Valley. These include proposed projects at Edwards AFB as well as in surrounding Kern, San Bernardino and Los Angeles counties. Hazards from regional seismic hazards have the potential to affect the region including Edwards AFB. Including appropriate building requirements would mitigate potential losses due to a seismic event.

Continued and future development in the Antelope Valley has the potential for increasing wind and storm water erosion of soils. Unmitigated ground disturbance during project implementation could add to wind and water erosion of soils.

Areas with Potential Cumulative Impacts

Impacts from a seismic event have the potential to cause impacts to Edwards AFB and the region. To reduce cumulative impacts from a seismic event, local municipalities require incorporation of appropriate building standards to mitigate losses.

Any area within the region currently under development or proposed for development has the potential for increasing wind and storm water erosion of soils.

4.11.4 Hazardous Materials and Hazardous Waste

Past, Present and Future Projects

Cumulative impacts of the proposed undertaking from hazardous waste/hazardous materials are taken into consideration with past, present and future projects within the Antelope Valley. These include proposed projects at Edwards AFB as well as in surrounding Kern, San Bernardino and Los Angeles counties.

Past activities at Edwards AFB have resulted in the generation of hazardous waste that now require remediation. As part of the ERP, Edwards AFB is actively working to remediate a number of OUs. Current practices at Edwards AFB include managing hazardous materials to reduce waste generation to comply with regulations. The proposed undertaking has the potential for generating minor amounts of hazardous waste during construction that would not add significantly to the current waste stream being generated by Edwards AFB.

Areas with Potential Cumulative Impacts

During construction, necessary hazardous materials would be managed according to Air Force requirements. A site-specific health and safety plan would minimize worker health and safety

exposures. The proposed undertaking would generate minor levels of hazardous waste during construction that would not likely add significantly to the current waste stream being generated by Edwards AFB. No cumulative impacts would occur.

4.11.5 Infrastructure

Past, Present and Future Projects

Cumulative impacts of the proposed undertaking for proposed infrastructure improvements are taken into consideration with past, present and future projects with the Antelope Valley. These include proposed projects at Edwards AFB as well as in surrounding Kern, San Bernardino and Los Angeles counties.

Past activities at Edwards AFB have required continued infrastructure improvements for present day uses at the Base. Future development at Edwards AFB will require additional improvements that would not cause conflicts with the existing infrastructure components.

Areas with Potential Cumulative Impacts

The proposed undertaking would enhance the infrastructure at the Base and reduce potential impacts to existing systems due to expanded uses. No cumulative impacts would occur.

4.11.6 Land Use

Past, Present and Future Projects

Cumulative impacts of the proposed undertaking for proposed land use resource and zoning changes are taken into consideration with past, present and future projects with the Antelope Valley. These include proposed projects at Edwards AFB as well as in surrounding Kern, San Bernardino and Los Angeles counties.

In accordance with land use activities and zoning, past activities at Edwards AFB have required continued land use improvements for present day uses at the base. Future development at

Edwards AFB will require additional improvements that would not cause conflicts with the existing land use components.

Areas with Potential Cumulative Impacts

The proposed undertaking would enhance the land use at the base and expand potential impacts to existing land use systems due to expanded uses. No cumulative impacts would occur.

4.11.7 Natural Resources

Past, Present and Future Projects

Cumulative impacts of the proposed undertaking on biological resources are taken into consideration with past, present and future projects within the Antelope Valley; these include projects proposed for Edwards AFB, as well as surrounding counties (Kern, San Bernardino and Los Angeles). Overall habitat in the Antelope Valley has been altered by human activities, resulting in conversion of undeveloped land and habitat loss, fragmentation and degradation. Reasonably foreseeable future projects that could impact biological resources in the cumulative impacts area characterize overall development trends in the Antelope Valley.

Areas with Potential Cumulative Impacts

Impacts on biological resources associated with a utility corridor could result from ground-disturbing activities such as project-related excavation, grading, trenching, vegetation clearance, the operation of heavy equipment or other surface disturbance that could directly or indirectly affect sensitive natural resources. Most of the impacts would be temporary and related to construction activities; habitat would likely return to pre-construction levels, with the exception of some permanent habitat loss for access roads and above-ground structures. Overall habitat loss associated with development in one of the utility corridors would be minimal and would be mitigated on a project by project basis.

4.11.8 Noise

Past, Present and Future Projects

Implementation of the Proposed Action is anticipated to require extensive planning for multiple projects that may take place at separate locations and different timeframes. Compiling a list of projects has a more practical application at the project level than at the programmatic level. Consequently, the evaluation of localized impacts will be required at the project level at the time of construction. Noise impacts from the Proposed Action would result in temporary ambient noise levels increases only during construction activities and are not anticipated to affect ambient noise levels permanently.

Areas with Potential Cumulative Impacts

Cumulative impacts would result if the Proposed Action caused a permanent increase in ambient noise levels. The Proposed Action would generate only short-term noise primarily from construction equipment and vehicles and it would not be expected to have a significant cumulative adverse effect when considered with other proposed projects occurring at the same time as the Proposed Action.

At the time of alternative selection, an evaluation of cumulative impacts from noise may be required at the project level for any existing construction projects within the corridor area of potential effect.

4.11.9 Socioeconomics

Past, Present and Future Projects

Cumulative impacts of the proposed undertaking for the proposed project activities are taken into consideration with past, present and future projects within the Antelope Valley. These include proposed projects at Edwards AFB, as well as in surrounding Kern, San Bernardino and Los Angeles counties.

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Past activities at Edwards AFB have required continued improvements for present day uses at the base. Future development at Edwards AFB will require additional improvements that would not cause conflicts with the existing socioeconomic components.

Areas with Potential Cumulative Impacts

The proposed undertaking would enhance the socioeconomic components at the base, as there will be a slight increase in employment. No adverse cumulative impacts would occur.

4.11.10 Water Resources

Past, Present and Future Projects

Cumulative impacts of the proposed undertaking from flooding hazards and potential decrease in water quality from soil erosion are taken into consideration with past, present and future projects with the Antelope Valley. These include proposed projects at Edwards AFB as well as in surrounding Kern, San Bernardino and Los Angeles counties.

Past activities at Edwards AFB have resulted in incorporation of design to reduce flooding hazards on base. Future projects at Edwards AFB would require consideration of the floodplain areas within the base and appropriate engineering needed to reduce flooding hazards.

Areas with Potential Cumulative Impacts

The proposed undertaking would require incorporation of appropriate engineering design to mitigate for potential flooding hazards where alternative selection included construction within a 100-year floodplain. Mitigations to reduce impacts from soil erosion to water quality would reduce potential impacts to a less than significant level. At the time of alternative selection, an evaluation of cumulative impacts from flooding hazards may be required at the project level for any existing construction projects within the corridor area of potential effect.

4.12 UNAVOIDABLE ADVERSE IMPACTS

4.12.1 Air Quality and Greenhouse Gases

Emissions resulting from construction equipment and vehicles would be below established significance and *de minimis* thresholds and would meet all local, state and federal regulations. Therefore, no unavoidable adverse air quality effects would occur as a result of the implementation of any of the project alternatives.

4.12.2 Cultural Resources

In terms of cultural resources, unavoidable significant adverse impacts would be those in which (1) no reasonably practicable mitigation measures can be taken to eliminate the impacts; and/or (2) in cases where no reasonable alternatives to the project would meet the purpose and need of the action, eliminate the impact and not cause other or similar significant adverse impacts.

A number of potential impacts identified for the proposed project on cultural resources could be mitigated (e.g., avoidance; selective placement of above-ground utility poles; placement of underground utility or fiber optic lines), although in some cases the impacts could not be fully mitigated. Examples of unavoidable adverse impacts include the demolition of NRHP-eligible architectural resources and the destruction of NRHP-eligible archaeological resources. Any ground disturbance that may encounter paleontological and/or cultural resources will result in the destruction of these nonrenewable resources.

4.12.3 Geology and Soils

With appropriate mitigations incorporated into the project design, potential impacts would be mitigated to a less than significant level. No unavoidable adverse impacts would occur from the proposed undertaking to geologic and soils resources.

4.12.4 Hazardous Materials and Hazardous Waste

With appropriate mitigations incorporated into the project design, potential impacts would be mitigated to a less than significant level. No unavoidable adverse impacts from the proposed undertaking from hazardous materials or hazardous waste would occur.

4.12.5 Infrastructure

With appropriate mitigations incorporated into the project design, potential impacts to various Air Force missions due to infrastructure expansion would be mitigated to a less than significant level. No unavoidable adverse impacts would occur from the proposed undertaking from the construction of any selected alternative.

4.12.6 Land Use

With appropriate mitigations incorporated into the project design, potential land use impacts would be mitigated to a less than significant level. No unavoidable adverse impacts from the proposed undertaking from the construction of any selected alternative.

4.12.7 Natural Resources

In terms of biological resources, unavoidable significant adverse impacts would be those in which (1) no reasonably practicable mitigation measures can be taken to eliminate the impacts; and/or (2) in cases where no reasonable alternatives to the project would meet the purpose and need of the action, eliminate the impact and not cause other or similar significant adverse impacts.

A number of potential impacts identified for the proposed project on biological resources could be mitigated (e.g., avoidance; selective placement of above-ground utility poles; placement of underground utility or fiber optic lines), although in some cases the impacts could not be fully mitigated. Examples of unavoidable adverse impacts include the removal of listed wildlife species or destruction of sensitive or rare plants.

However, all adverse impacts to natural resources associated with the proposed utility corridors would not be significant or would be reduced to a level that is not significant as discussed in Section 4.7.

4.12.8 Noise

No unavoidable adverse noise impacts would result from implementation of any alternative selected.

4.12.9 Socioeconomics

No unavoidable adverse socioeconomic impacts would occur from the proposed undertaking or from construction of any selected alternative.

4.12.10 Water Resources

For water resources, the primary concerns associated with the alternatives include effects on water quality during development-related construction activities as well as impacts to designated floodplain areas. Assuming that features to minimize effects of flooding are incorporated into the construction design of each project, no unavoidable adverse impacts should occur.

Therefore, with appropriate mitigations incorporated into the project design, potential impacts would be mitigated to a less than significant level. No unavoidable adverse impacts would occur from the proposed undertaking or from an increase in flooding hazards and a decrease in water quality due to erosion.

4.13 SHORT-TERM VERSUS LONG-TERM PRODUCTIVITY OF THE ENVIRONMENT

Examples of short-term uses of the environment include direct, construction-related disturbances and direct impacts associated with an increase in population and activity that occurs over a period typically less than 5 years. Long-term uses of the environment include impacts occurring over a period of more than 5 years, including permanent resource loss.

In the short-term, the project would result in minor, temporary, direct construction-related disturbances, but would not result in an increase in population in the area.

4.13.1 Air Quality and Greenhouse Gases

Short-term adverse impacts would result from dust and construction equipment and vehicles. However, such emissions would be below established significance and *de minimis* thresholds and would meet all local, state and federal regulations. No long-term impacts would occur with the implementation of minimization measures described in Section 4.1.2.

4.13.2 Cultural Resources

In accordance with Section 102 of NEPA, all archaeological field studies, data recovery and analyses associated with the proposed utility corridors would contribute to the present level of professional knowledge about cultural resources. As a result, information resulting from these surveys, identification, documentation of resources and the potential loss of one site should be useful in future efforts to interpret and educate the general public and archaeological community about the cultural resources of the Antelope Valley. In the absence of this project (or cumulative projects in the Antelope Valley), the recovery and interpretation of those sites is not expected to occur.

Likewise, similar documentation for paleontological resources in this area of the Antelope Valley would contribute to the greater understanding of fossil remains; it is anticipated that the proposed project would affect only a small percentage of paleontological resources and create no significant long-term loss of potential for exploration and recovery of these resources.

4.13.3 Geology and Soils

Regional seismic hazards have the potential to affect geologic resources in the short and the long terms. Temporary, minor, adverse impacts to soils would occur in the short term due to clearing and vegetation removal associated with the construction of any selected utility corridor alternative. With appropriate mitigation, including adherence to appropriate building

requirements, the proposed undertaking would reduce short-term or long-term impacts to geologic or soil resources to less than significant.

4.13.4 Hazardous Materials and Hazardous Waste

Short-term adverse impacts may result from the use of hazardous materials and subsequent disposal of hazardous waste during the construction of any selected utility corridor. The disposal of hazardous waste could result in potential impacts to the environment, as well the health and safety of personnel, if it is not properly handled. Compliance with all applicable Federal, State and local laws and regulations addressing hazardous material and waste management is required and would ensure proper handling, storage and disposal of hazardous materials and wastes, which would reduce the hazardous material and waste impacts to less than significant.

4.13.5 Infrastructure

Construction of any selected utility corridor alternative would not cause an increased or decreased use of infrastructure at Edwards AFB and, therefore, there would be no long-term changes in population or productivity of the environment as a result of this project. However, construction of any selected utility corridor alternative may result in long term positive impacts to infrastructure by enhancing the delivery of natural gas, water, communication and electrical or power transmission. With appropriate mitigation, the proposed undertaking would not result in short-term adverse impacts to infrastructure at Edwards AFB.

4.13.6 Land Use

Construction of any selected utility corridor alternative may cause short and long term adverse impacts to land use at Edwards AFB, if the design is not consistent with the Installation Development Plan. Prior to final design selection, coordination will be required to ensure that the design does not cause conflict. Maintaining compatibility with existing land uses established in the Installation Development Plan would eliminate short or long term adverse impacts to land use.

4.13.7 Natural Resources

In the short-term, the project would result in minor, temporary, direct construction-related disturbances to the natural resources in the project area. In the long-term, there would be no changes in productivity of the habitats on Edwards AFB or in the surrounding areas. It is anticipated that the proposed project would affect only a small percentage of biological resources in the area and would not create significant long-term loss of such resources. With appropriate mitigation, the proposed undertaking would not result in significant short-term or long-term impacts to biological resources at Edwards AFB or the surrounding area.

4.13.8 Noise

Noise generated during construction of the selected alternative would not cause short term or long term productivity changes to the adjacent environment. The selected alternative would be constructed in areas that are undeveloped and would generate short term temporary noise increases only during construction activities.

4.13.9 Socioeconomics

Project activities would provide a short-term incrementally, positive impact to the economic impact region from increased revenue generation. This increase in revenue is expected to occur as a result of money spent off base for the hiring of a labor force from the region and the expenditure of funds for materials and supplies. However, there would be no social impacts such as those related to relocation of residents or impacts on lifestyle.

4.13.10 Water Resources

.Construction of any selected utility corridor alternative would not cause any other changes in use at Edwards AFB and, therefore, there would be no long-term changes in population or productivity of the environment as a result of this project. With appropriate mitigation, the proposed undertaking would not result in short-term or long-term impacts from flooding hazards or a decrease in water quality due to soil erosion.

4.14 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

In accordance with NEPA (40 CFR 1502.16), this section includes a discussion of any irreversible and irretrievable commitment of resources associated with the proposed project. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of those resources will have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of implementing an action (e.g., extinction of a rare or threatened species, or the disturbance of an important cultural resource site). There would be no irreversible or irretrievable commitment of resources for any of the environmental resources analyzed in this EA, except possibly for cultural resources. Biological and water resources are also discussed here but are unlikely to result in the irreversible or irretrievable commitment of resources if appropriate mitigation measures are implemented.

A commitment of resources is irreversible when its primary or secondary impacts limit the future option for a resource. An irretrievable commitment refers to the use or consumption of resources that is neither renewable nor recoverable for later use by future generations, such as the loss of cultural, paleontological, biological or water resources. Thus, any ground disturbance that may encounter paleontological and/or cultural resources will result in the destruction of these nonrenewable resources. Ground disturbance could temporarily or permanently affect biological or water resources as well, although impacts are more likely to be temporary.

For good stewardship of the resources identified along the corridors, all previously unevaluated archaeological sites should be formally evaluated for inclusion to the NRHP, with site-specific mitigation being developed prior to the proposed construction activities. Under NHPA, cultural resources eligible for listing in the NRHP would be protected from development. Native American resources, once destroyed or altered, cannot be replaced; any loss of sacred sites or traditional cultural properties would be considered irreversible and irretrievable.

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For natural resources, development of one or more utility corridors at Edwards AFB would result in temporary impacts associated with construction and long-term impacts associated with utility maintenance and access road construction. With proper mitigation, both temporary and permanent impacts can be mitigated such that there would be no irreversible or irretrievable commitment of natural resources.

For water resources, as discussed above in Section 4.12, Unavoidable Adverse Impacts, the primary concerns associated with the alternatives include effects on water quality during development-related construction activities as well as impacts to designated floodplain areas. Assuming that features to minimize effects of flooding are incorporated into the construction design of each project, no irreversible or irretrievable commitment of water resources should occur.

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8.0 ACRONYMS AND ABBREVIATIONS

AB	Assembly bill
ACCS	Accumulation sites
ACEC	Area of Critical Environmental Concern
ADP	Area Development Plan
AF	Air Force
AFB	Air Force Base
AFI	Air Force Instruction
AFRL	Air Force Research Laboratory
amsl	Above mean sea level
AP	Accumulation point for hazardous waste
APE	Area of Potential Effect
ARB	Air Resources Board
AVAQMD	Antelope Valley Air Quality Management District
AVEK	Antelope Valley East Kern (Water Agency)
BCC	Bird of conservation concern
BFTF	Birk Flight Test Facility
bgs	Below ground surface
BLM	U.S. Department of the Interior, Bureau of Land Management
BO	Biological Opinion
BP	Before present
°C	Celsius
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CalOSHA	California Federal Occupational Safety and Health Act
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CATM	Combat Arms Training and Maintenance
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDS	Container Delivery System
CEG	Civil Engineer Group
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CESA	California Endangered Species Act
CFR	Code of Federal Regulation
CH ₄	Methane
CHL	California Historic Landscape
CNDDB	California Natural Diversity Database

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CNPS	California Native Plant Society
CO	Carbon monoxide
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent mass
CRHP	California Registration of Historic Places
CRP	Compliance Restoration Program
CRWQCB	California Regional Water Quality Control Board
dB	Decibel
DoD	Department of Defense
DoDI	Department of Defense Instruction
DTSC	Department of Toxic Substance Control
DWMA	Desert Wildlife Management Area
DZ	Drop zone
EA	Environmental Assessment
EKAPCD	Eastern Kern Air Pollution Control District
EO	Executive Order
EPA	United States Environmental Protection Agency (USEPA)
ERP	Environmental Restoration Program
°F	Degrees Fahrenheit
FCAA	Clean Air Act Amendments of 1990 (Federal)
FFA	Federal Facilities Agreement
GHG	Greenhouse gas
GWP	Global warming potential
HazMER	Hazardous Material Excess Reutilization Program
HFCs	Hydrofluorocarbons
HWSF	Hazardous Waste Support Facility
IAPs	Initial accumulation points
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
lb/day	Pounds per day
Ksat	Saturated hydraulic conductivity
kV	Kilovolt
LQG	Large Quantity Generator
MBTA	Migratory Bird Treaty Act
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MFH	Military Family Housing
µg/m ³	Micrograms per cubic meter
MM	Mitigation measure
MRR	California Mandatory Reporting Regulation
MSL	Mean sea level
MSW	Municipal solid waste
MTCO _{2e}	Metric tons of CO ₂ -equivalent mass

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MVA	Megavolt ampere
N/A	Not applicable
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NASA	National Aeronautical Space Administration
NEPA	National Environmental Policy Act
NHM	Natural History Museum of Los Angeles County
NHPA	National Historic Preservation Act of 1966
NO	Nitrogen monoxide
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides
N ₂ O	Nitrous oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
NRHP	California Register of Historic Places
O ₃	Ozone
OSHA	Federal Occupational Safety and Health Act
OU	Operable Unit
PA	Programmatic Agreement
Pb	Lead
PFCs	Perfluorocarbons
PG&E	Pacific Gas & Electric
PIRA	Precision Impact Range Area
PM _{2.5}	Particulate matter less than 2.5 microns in diameter
PM ₁₀	Respirable particulate matter less than 10 microns in diameter
POL	Petroleum, Oil, Lubricants (storage area at EAFB)
ppb	Parts per billion
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
RF	Radio frequency
RFS	Renewable Fuel Standards
RI	Remedial Investigation
RPIR	Real property inventory requirements
ROD	Record of Decision
ROG	Reactive organic gases
RUSLE	Revised Universal Soil Loss Equation
SARA	Superfund Amendments and Reauthorization Act
SCE	Southern California Edison
SEA	Significant Ecological Area
SF ₆	Sulfur hexafluoride
SHPO	State Historic Preservation Office/Officer
SIP	State Implementation Plan
SO ₂	Sulfur dioxide

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SO ₄	Sulfates
SR	California State Route
SSC	California Species of Special Concern
SWPPP	Storm Water Pollution Prevention Plan
TOSCA	Toxic Substance Control Act
tpy	Tons per year
TW	Test wing
TSDF	Treatment, Storage and Disposal Facility
UAS	Unmanned aircraft system
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USLE	Universal Soil Loss Equation
UW	Universal waste
UXO	Unexploded ordinance
VOC	Volatile Organic Compounds
WMA	Water Management Area
WEAP	Worker environmental awareness program
WEG	Wind Erodibility Group
WEMO	West Mojave Plan
WWTP	Wastewater treatment plant